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TECHNICAL MANPOWER IN NEW YORK STATE. VOLUME I, SUPPLEMENT A, APPENDIX TABLES.

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THE 53 TABLES OF DATA COLLECTED FROM A SURVEY OF 17,414 ESTABLISHMENTS IN NEW YORK INCLUDE (1) NUMBER OF ESTABLISHMENTS WITH TECHNICAL OCCUPATIONS AND WITH ENGINEERS OR SCIENTISTS, BY INDUSTRY GROUP (INCLUDING NUMBER OF WORKERS THEY EMPLOY, NUMBER IN TECHNICAL OCCUPATIONS, AND NUMBER WHO ARE ENGINEERS AND SCIENTISTS), (2) NUMBER IN HOURLY-RATED AND IN SALARIED TECHNICAL OCCUPATIONS AND NUMBER EARNING LESS THAN TWO DOLLARS AN HOUR OR $75 A WEEK, BY OCCUPATIONAL GROUP, (3) NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY AREA, (4) NUMBER OF UNION MEMBERS IN EACH DETAILED TECHNICAL OCCUPATION, (5) NUMBER OF VACANCIES REPORTED IN EACH TECHNICAL OCCUPATION, (6) EDUCATION REQUIRED BY EMPLOYERS IN EACH TECHNICAL OCCUPATION GROUP, (7) LICENSES AND TESTS REQUIRED BY EMPLOYERS, BY TECHNICAL OCCUPATION GROUP, AND (8) NUMBER OF ENGINEERS, SCIENTISTS, AND TEACHERS OF ENGINEERING, SCIENCE, AND TECHNOLOGY IN EACH DETAILED OCCUPATION. "TECHNICAL MANPOWER IN NEW YORK STATE," VOLUME I, SUPPLEMENT B, AND VOLUME II (VT 000 576 - 000 579) ARE RELATED DOCUMENTS. (FS)

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TECHNICAL MANPOWER IN NEW YORK STATE

VOLUME I

SUPPLEMENT A

NEW YORK STATE • DEPARTMENT OF LABOR
DIVISION OF RESEARCH AND STATISTICS

In cooperation with
- *The State Education Department*
- *State University of New York*

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TECHNICAL MANPOWER IN NEW YORK STATE

VOLUME I, SUPPLEMENT A

APPENDIX TABLES

STATE OF NEW YORK
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DEPARTMENT OF LABOR
M. P. CATHERWOOD, *Industrial Commissioner*

In cooperation

with

THE STATE EDUCATION DEPARTMENT
JAMES E. ALLEN, JR., *Commissioner of Education*

STATE UNIVERSITY OF NEW YORK
SAMUEL B. GOULD, *President of the State University*

NEW YORK STATE DEPARTMENT OF LABOR
Division of Research and Statistics

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This report consists of volume 1, supplement A (the present volume, containing the appendix tables of volume 1), supplement B (job projections), and volume 2 (detail on each of fifteen groups of technical occupations).

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Table 1. NUMBER OF ESTABLISHMENTS (1) WITH TECHNICAL OCCUPATIONS AND (2) WITH ENGINEERS OR SCIENTISTS, BY INDUSTRY GROUP

(Including number of workers they employ, number in technical occupations, and number who are engineers and scientists)

Industry group	All establishments		Establishments with technical occupations			Establishments with engineers or scientists		
	Establishments	Employees	Establishments	Employees	Persons in technical occupations	Establishments	Employees	Engineers and scientists
All industries	393,516	6,227,656	14,595	2,550,734	148,684	14,437	2,539,357	142,732
Manufacturing	48,017	1,876,160	3,590	903,311	59,085	4,576	938,384	54,563
Durable goods	13,758	822,545	2,493	630,181	49,821	2,984	645,706	42,179
Ordnance and accessories	15	18,766	15	18,766	3,125	15	18,766	2,705
Lumber and wood products, except furniture	1,334	16,283	9	1,378	26	11	1,886	21
Furniture and fixtures	1,607	34,803	82	11,621	534	50	10,780	101
Stone, clay, and glass products	1,159	50,174	140	34,704	1,423	128	37,446	1,836
Primary metal industries	585	71,965	114	58,884	1,606	161	60,094	1,336
Fabricated metal products	3,079	94,997	495	48,474	2,567	560	51,611	1,812
Machinery, except electrical	2,762	157,043	604	126,324	9,622	843	131,355	7,348
Electrical machinery and equipment	1,767	174,858	781	152,072	13,534	801	152,725	13,295
Transportation equipment	437	101,186	97	89,837	8,771	157	90,762	5,561
Instruments; photographic and optical goods	1,013	102,470	156	88,121	8,613	258	90,281	8,164
Nondurable goods	34,259	1,053,615	1,097	273,130	9,264	1,592	292,678	12,384
Food and kindred products	3,360	154,839	334	63,231	1,553	329	67,853	1,839
Tobacco manufactures	59	2,815	7	2,445	22	6	1,500	24
Textile mill products	1,859	64,417	70	13,513	456	101	17,120	496
Apparel and other finished fabric products	13,146	314,511	22	12,323	78	52	15,782	80
Paper and allied products	1,066	68,351	90	29,347	916	130	33,267	986
Printing, publishing, and allied industries	6,333	171,221	82	42,015	1,094	50	30,958	223
Chemicals and allied products	1,474	87,445	317	59,050	3,807	650	72,111	7,314
Petroleum refining and related industries	129	11,462	25	9,657	766	22	9,755	786
Rubber and miscellaneous plastics products	760	23,203	57	8,811	223	99	12,900	334
Leather and leather products	1,401	61,135	21	15,437	120	13	13,637	34
Miscellaneous manufacturing industries	4,672	94,216	72	17,301	229	140	17,795	268
Nonmanufacturing	345,499	4,351,496	11,005	1,647,423	89,599	9,861	1,600,973	88,169
Mining	520	9,129	8	2,555	39	16	3,746	138
Contract construction	33,948	302,532	1,551	112,293	7,523	2,557	126,294	7,820
General building contractors	9,274	67,229	336	24,054	3,190	597	29,779	2,449
Heavy construction	2,072	52,342	348	32,200	1,657	864	39,933	2,610
Special trade contractors	22,602	182,961	867	56,039	2,676	1,096	56,582	2,761
Transportation, communication, and public utilities	13,075	469,627	378	260,029	14,084	254	243,381	4,728
Railroad transportation	153	57,180	29	47,755	973	23	41,251	312
Local and interurban passenger transportation	1,989	37,011	1	1,310	5	1	1,310	1
Motor freight transportation and warehousing	7,429	76,175	2	2,463	9	3	1,306	11
Water transportation	842	67,161	9	10,105	23	49	14,290	276
Air transportation	197	39,665	31	31,734	2,460	10	21,797	124
Pipe line transportation	8	180	—	—	—	—	—	—

Continued

Table 1. NUMBER OF ESTABLISHMENTS (1) WITH TECHNICAL OCCUPATIONS AND (2) WITH ENGINEERS OR SCIENTISTS, BY INDUSTRY GROUP

(Including number of workers they employ, number in technical occupations, and number who are engineers and scientists)

Industry group	All establishments		Establishments with technical occupations			Establishments with engineers or scientists		
	Establishments	Employees	Establishments	Employees	Persons in technical occupations	Establishments	Employees	Engineers and scientists
Transportation services	1,781	21,781	1	845	4	66	4,064	214
Communication	377	114,024	242	111,766	8,175	60	106,705	2,428
Electric, gas, and sanitary services	299	56,450	63	54,051	2,435	42	52,658	1,362
Wholesale and retail trade	150,121	1,251,656	807	94,363	6,299	2,037	98,303	6,585
Wholesale trade	40,767	421,582	599	39,458	5,870	1,866	46,589	6,246
Retail trade	109,334	830,074	208	54,905	429	171	51,714	339
Building materials, hardware, and farm equipment	5,808	31,398	15	697	68	63	894	63
General merchandise stores	4,050	146,273	20	35,468	135	13	33,554	46
Food stores	19,299	150,296	10	2,567	26	7	2,685	7
Automotive dealers and service stations	14,056	78,179	—	—	—	—	—	—
Apparel and accessories	10,035	87,211	5	5,725	18	7	6,336	10
Furniture, home furnishings, and equipment	6,589	36,146	111	1,684	119	33	264	165
Eating and drinking places	29,801	214,819	4	7,309	18	3	6,159	3
Miscellaneous retail stores	19,696	85,752	43	1,455	45	45	1,822	45
Finance, insurance, and real estate	44,738	492,964	183	191,930	2,124	564	110,515	1,175
Banking	937	130,011	49	78,633	459	7	35,296	43
Credit agencies other than banks	1,484	20,104	6	3,126	35	—	—	—
Security and commodity brokers, dealers, exchanges, and services	1,904	60,750	34	25,245	189	1	1,500	2
Insurance carriers	1,360	120,115	58	72,680	1,164	126	60,648	614
Insurance agents, brokers, and services	5,480	31,989	19	5,578	137	43	3,264	55
Real estate	31,039	118,543	10	4,230	41	386	8,107	419
Combinations of real estate, insurance, loan, law offices	1,556	4,748	—	—	—	—	—	—
Holding and other investment companies	978	6,704	7	2,438	99	1	1,700	42
Services and miscellaneous	99,989	950,995	7,232	297,905	38,467	3,785	307,918	35,829
Hotels, rooming houses, camps, and other lodging places	5,779	66,516	15	375	30	32	3,805	37
Personal services	20,738	99,963	5	365	22	4	548	8
Miscellaneous business services	10,633	180,165	414	40,441	6,179	497	36,101	6,748
Advertising, news, credit, duplicating, building, and related services	4,532	86,907	9	8,517	46	10	8,760	42
Business services n.e.c.	6,101	93,258	405	31,924	6,133	487	27,341	6,706
Research, development, testing laboratories	302	14,432	158	13,090	2,803	216	13,386	3,924
Business and management consulting services	2,387	23,359	99	8,738	2,042	144	9,325	2,162
Other business services n.e.c.	3,412	55,467	148	10,096	1,288	127	4,630	620
Automobile repair, automobile services, garages	5,981	27,806	1	1,580	4	—	—	—
Miscellaneous repair services	3,972	16,451	21	532	208	1	132	4
Motion pictures	1,635	28,630	23	4,880	203	7	1,532	32
Amusement and recreation, except motion pictures	4,970	44,050	14	2,288	42	3	1,540	19

Continued

Table 2. NUMBER OF ESTABLISHMENTS (1) WITH TECHNICAL OCCUPATIONS BUT NO ENGINEERS OR SCIENTISTS, (2) WITH ENGINEERS OR SCIENTISTS BUT NO TECHNICAL OCCUPATIONS, AND (3) WITH BOTH, BY INDUSTRY GROUP

(Including number of workers they employ, number in technical occupations, and number who are engineers and scientists)

Industry group	Establishments with technical occupations but no engineers or scientists			Establishments with engineers or scientists but no technical occupations			Establishments with both technical occupations and engineers or scientists			
	Establishments	Employees	Persons in technical occupations	Establishments	Employees	Engineers and scientists	Establishments	Employees	Persons in technical occupations	Engineers and scientists
All industries	7,862	347,184	24,387	7,704	335,807	25,575	6,733	2,203,550	124,297	117,157
Manufacturing	1,064	74,371	3,537	2,050	109,444	4,060	2,526	828,940	55,548	50,503
Durable goods	652	27,782	1,884	1,143	43,307	2,079	1,841	602,399	47,937	40,100
Ordnance and accessories	—	—	—	—	—	—	15	18,766	3,125	2,705
Lumber and wood products, except furniture	—	—	—	2	508	4	9	1,378	26	17
Furniture and fixtures	36	1,920	114	4	1,079	7	46	9,701	420	94
Stone, clay, and glass products	71	1,792	107	59	4,534	80	69	32,912	1,316	1,756
Primary metal industries	38	2,926	149	85	4,136	258	76	55,958	1,457	1,078
Fabricated metal products	196	8,232	491	261	11,369	371	299	40,242	2,076	1,441
Machinery, except electrical	156	5,784	419	395	10,815	746	448	120,540	9,203	6,602
Electrical machinery, and equipment	97	3,956	406	117	4,609	241	684	148,116	13,128	13,054
Transportation equipment	14	2,104	14	74	3,029	129	83	87,733	8,757	5,432
Instruments; photographic and optical goods	44	1,068	184	146	3,228	243	112	87,053	8,429	7,921
Nondurable goods	412	46,589	1,653	907	66,137	1,981	685	226,541	7,611	10,403
Food and kindred products	195	12,698	379	190	17,320	357	139	50,533	1,174	1,482
Tobacco manufactures	1	945	4	—	—	—	6	1,500	18	24
Textile mill products	18	1,484	75	49	5,091	57	52	12,029	381	439
Apparel and other finished fabric products	7	2,215	8	37	5,674	39	15	10,108	70	41
Paper and allied products	9	2,203	31	49	6,123	75	81	27,144	885	911
Printing, publishing, and allied industries	62	17,699	923	30	6,642	59	20	24,316	171	164
Chemicals and allied products	22	760	82	355	13,821	1,042	295	58,290	3,725	6,272
Petroleum refining and related industries	9	342	9	6	440	33	16	9,315	757	753
Rubber and miscellaneous plastics products	23	598	46	65	4,687	152	34	8,213	177	182
Leather and leather products	9	1,911	18	1	111	1	12	13,526	102	33
Miscellaneous manufacturing industries	57	5,734	78	125	6,228	166	15	11,567	151	102
Nonmanufacturing	6,798	272,813	20,850	5,654	226,363	21,515	4,207	1,374,610	68,749	66,654
Mining	—	—	—	8	1,191	32	8	2,555	39	106
Contract constuction	460	21,081	1,379	1,466	35,082	2,983	1,091	91,212	6,144	4,837
General building contractors	65	1,792	281	326	7,517	715	271	22,262	2,909	1,734
Heavy construction	49	3,532	130	565	11,265	1,356	299	28,668	1,527	1,254
Special trade contractors	346	15,757	968	575	16,300	912	521	40,282	1,708	1,849

Continued

Table 1. NUMBER OF ESTABLISHMENTS (1) WITH TECHNICAL OCCUPATIONS AND (2) WITH ENGINEERS OR SCIENTISTS, BY INDUSTRY GROUP

(Including number of workers they employ, number in technical occupations, and number who are engineers and scientists)

Industry group	All establishments		Establishments with technical occupations			Establishments with engineers or scientists		
	Establishments	Employees	Establishments	Employees	Persons in technical occupations	Establishments	Employees	Engineers and scientists
Private medical services	18,468	184,991	5,255	153,739	16,496	550	132,568	1,836
Offices of physicians and surgeons	10,209	20,680	1,468	5,890	2,173	66	1,556	105
Offices of dentists and dental surgeons	5,689	9,241	2,576	5,437	3,284	—	—	—
Hospitals (nongovernment)	394	135,532	370	134,581	7,402	309	127,339	1,411
Proprietary hospitals	100	13,729	81	13,063	568	59	11,952	128
Voluntary hospitals	294	121,803	289	121,518	6,834	250	115,387	1,283
Medical and dental laboratories	783	4,451	739	4,344	3,146	109	725	175
Offices of osteopathic physicians, chiropractors, and health and allied services n.e.c.	1,393	15,087	102	3,487	491	66	2,948	145
Legal services	9,733	32,968	—	—	—	6	450	60
Private colleges and schools	2,066	112,937	89	51,114	3,754	730	93,595	16,607
Nonprofit membership organizations	6,491	79,640	53	12,569	349	49	6,125	88
Miscellaneous services	6,815	64,796	1,342	30,022	11,180	1,804	31,114	10,288
Engineering and architectural services	1,964	25,276	1,309	22,894	9,904	1,599	23,532	8,694
Nonprofit educational and scientific research	580	14,876	12	5,174	1,094	197	7,198	1,532
Accounting, auditing, bookkeeping, and other services n.e.c.	4,271	24,644	21	1,954	182	8	384	62
Miscellaneous	2,708	12,082	—	—	—	102	408	102
Government	3,108	874,593	846	688,348	21,063	648	710,816	31,894
County	88	96,994	77	95,232	1,587	74	94,179	1,141
Hospitals	16	6,566	16	6,566	311	9	5,402	71
Colleges	15	2,078	5	545	12	13	2,066	582
Other	57	88,350	56	88,121	1,264	52	86,711	488
New York State	695	127,327	176	96,086	4,905	150	86,096	5,897
Hospitals	25	33,063	25	33,063	814	22	30,966	279
Colleges	26	10,898	16	7,812	520	26	10,898	2,183
Other	644	83,366	135	55,211	3,571	102	44,232	3,435
New York City	139	271,335	73	210,132	6,390	79	254,166	10,328
Hospitals	20	33,156	20	33,156	1,199	18	30,211	380
Colleges	9	8,402	9	8,402	183	9	8,402	1,352
Other	110	229,777	44	168,574	5,008	52	215,553	8,596
Cities other than New York City	114	76,350	107	75,488	877	95	72,538	3,145
Hospitals	10	2,018	9	1,944	48	3	1,082	7
Colleges	4	356	—	—	—	4	356	60
Other	100	73,976	98	73,544	829	88	71,100	3,078
Towns and villages	1,575	118,056	296	100,381	966	165	94,398	8,286
Hospitals	5	1,066	5	1,066	48	5	1,066	10
Other	1,570	116,990	291	99,315	918	160	93,332	8,276
Federal	497	184,531	117	111,029	6,338	85	109,439	3,097
Hospitals	18	15,791	18	15,791	963	15	15,310	203
Colleges	1	266	1	266	7	1	266	33
Arsenals and navy yards	2	16,646	2	16,646	1,469	2	16,646	836
Other	476	151,828	96	78,326	3,899	67	77,217	2,025

Table 2. NUMBER OF ESTABLISHMENTS (1) WITH TECHNICAL OCCUPATIONS BUT NO ENGINEERS OR SCIENTISTS, (2) WITH ENGINEERS OR SCIENTISTS BUT NO TECHNICAL OCCUPATIONS, AND (3) WITH BOTH, BY INDUSTRY GROUP

(Including number of workers they employ, number in technical occupations, and number who are engineers and scientists)

Industry group	Establishments with technical occupations but no engineers or scientists			Establishments with engineers or scientists but no technical occupations			Establishments with both technical occupations and engineers or scientists			
	Establishments	Employees	Persons in technical occupations	Establishments	Employees	Engineers and scientists	Establishments	Employees	Persons in technical occupations	Engineers and scientists
Transportation, communication, and public utilities	247	31,382	1,475	123	14,734	508	131	228,647	12,609	4,220
Railroad transportation	7	6,707	88	1	203	3	22	41,048	885	309
Local and interurban passenger transportation	—	—	—	—	—	—	1	1,310	5	1
Motor freight transportation and warehousing	1	1,363	3	2	206	8	1	1,100	6	3
Water transportation	6	5,189	13	46	9,374	262	3	4,916	10	14
Air transportation	22	10,264	542	1	327	2	9	21,470	1,918	122
Pipe line transportation	—	—	—	—	—	—	—	—	—	—
Transportation services	1	845	4	66	4,064	214	—	—	—	—
Communication	187	5,290	785	5	229	13	55	106,476	7,390	2,415
Electric, gas, and sanitary services	23	1,724	40	2	331	6	40	52,327	2,395	1,356
Wholesale and retail trade	448	34,198	4,300	1,678	38,138	3,754	359	60,165	1,999	2,831
Wholesale trade	302	16,118	4,058	1,569	23,249	3,641	297	23,340	1,812	2,605
Retail trade	146	18,080	242	109	14,889	113	62	36,825	187	226
Building materials, hardware, and farm equipment	5	227	8	53	424	53	10	470	60	10
General merchandise stores	10	7,527	69	3	5,613	4	10	27,941	66	42
Food stores	5	1,482	13	2	1,600	2	5	1,085	13	5
Automotive dealers and service stations	—	—	—	—	—	—	—	—	—	—
Apparel and accessories	4	4,625	17	6	5,236	9	1	1,100	1	1
Furniture, home furnishings, and equipment	78	1,420	86	—	—	—	33	264	33	165
Eating and drinking places	3	2,020	8	2	870	2	1	5,289	10	1
Miscellaneous retail stores	41	779	41	43	1,146	43	2	676	4	2
Finance, insurance, and real estate	138	98,050	1,248	519	16,635	871	45	93,880	876	304
Banking	42	43,337	256	—	—	—	7	35,296	203	43
Credit agencies other than banks	6	3,126	35	—	—	—	—	—	—	—
Security and commodity brokers, dealers, exchanges, and services	33	23,745	186	—	—	—	1	1,500	3	2
Insurance carriers	40	23,282	636	108	11,250	446	18	49,398	528	168
Insurance agents, brokers, and services	11	3,822	87	35	1,508	45	8	1,756	50	10
Real estate	—	—	—	376	3,877	380	10	4,230	41	39
Combinations of real estate, insurance, loan, law offices	—	—	—	—	—	—	—	—	—	—
Holding and other investment companies	6	738	48	—	—	—	1	1,700	51	42

Continued

Table 2. NUMBER OF ESTABLISHMENTS (1) WITH TECHNICAL OCCUPATIONS BUT NO ENGINEERS OR SCIENTISTS, (2) WITH ENGINEERS OR SCIENTISTS BUT NO TECHNICAL OCCUPATIONS, AND (3) WITH BOTH, BY INDUSTRY GROUP

(Including number of workers they employ, number in technical occupations, and number who are engineers and scientists)

Industry group	Establishments with technical occupations but no engineers or scientists			Establishments with engineers or scientists but no technical occupations			Establishments with both technical occupations and engineers or scientists			
	Establishments	Employees	Persons in technical occupations	Establishments	Employees	Engineers and scientists	Establishments	Employees	Persons in technical occupations	Engineers and scientists
Services and miscellaneous	5,190	52,546	10,721	1,743	62,559	8,048	2,042	245,359	27,746	27,781
Hotels, rooming houses, camps, and other lodging places	—	—	—	17	3,430	22	15	375	30	15
Personal services	3	153	6	2	336	2	2	212	16	6
Miscellaneous business services	130	13,593	809	213	9,253	1,082	284	26,848	5,370	5,666
Advertising, news, credit, duplicating, building, and related services	4	5,349	24	5	5,592	32	5	3,168	22	10
Business services n.e.c.	126	8,244	785	208	3,661	1,050	279	23,680	5,348	5,656
Research, development, testing laboratories	12	275	66	70	571	136	146	12,815	2,737	3,788
Business and management consulting services	28	1,762	253	73	2,349	715	71	6,976	1,789	1,447
Other business services n.e.c.	86	6,207	466	65	741	199	62	3,889	822	421
Automobile repair, automobile services, garages	1	1,580	4	—	—	—	—	—	—	—
Miscellaneous repair services	20	400	160	—	—	—	1	132	48	4
Motion pictures	19	3,504	156	3	156	6	4	1,376	47	26
Amusement and recreation, except motion pictures	11	748	11	—	—	—	3	1,540	31	19
Private medical services	4,742	21,253	8,427	37	82	46	513	132,486	8,069	1,790
Offices of physicians and surgeons	1,424	4,378	1,902	22	44	22	44	1,512	271	83
Offices of dentists and dental surgeons	2,576	5,437	3,284	—	—	—	—	—	—	—
Hospitals (nongovernment)	61	7,242	265	—	—	—	309	127,339	7,137	1,411
Proprietary hospitals	22	1,111	51	—	—	—	59	11,952	517	128
Voluntary hospitals	39	6,131	214	—	—	—	250	115,387	6,620	1,283
Medical and dental laboratories	645	3,657	2,802	15	38	24	94	687	344	151
Offices of osteopathic physicians, chiropractors, and health and allied services n.e.c.	36	539	174	—	—	—	66	2,948	317	145
Legal services	—	—	—	6	450	60	—	—	—	—
Private colleges and schools	12	861	39	653	43,342	5,312	77	50,253	3,715	11,295
Nonprofit membership organizations	34	7,716	178	30	1,272	36	19	4,853	171	52
Miscellaneous services	218	2,738	931	680	3,830	1,380	1,124	27,284	10,249	8,908
Engineering and architectural services	205	1,168	777	495	1,806	1,185	1,104	21,726	9,127	7,509
Nonprofit educational and scientific research	—	—	—	185	2,024	195	12	5,174	1,094	1,337
Accounting, auditing, bookkeeping, and other services n.e.c.	13	1,570	154	—	—	—	8	384	28	62
Miscellaneous	—	—	—	102	408	102	—	—	—	—

Continued

Table 2. NUMBER OF ESTABLISHMENTS (1) WITH TECHNICAL OCCUPATIONS BUT NO ENGINEERS OR SCIENTISTS, (2) WITH ENGINEERS OR SCIENTISTS BUT NO TECHNICAL OCCUPATIONS, AND (3) WITH BOTH, BY INDUSTRY GROUP

(Including number of workers they employ, number in technical occupations, and number who are engineers and scientists)

Industry group	Establishments with technical occupations but no engineers or scientists			Establishments with engineers or scientists but no technical occupations			Establishments with both technical occupations and engineers or scientists			
	Establishments	Employees	Persons in technical occupations	Establishments	Employees	Engineers and scientists	Establishments	Employees	Persons in technical occupations	Engineers and scientists
Government	315	35,556	1,727	117	58,024	5,319	531	652,792	19,336	26,575
County	11	2,574	59	8	1,521	363	66	92,658	1,528	778
Hospitals	7	1,164	49	—	—	—	9	5,402	262	71
Colleges	—	—	—	8	1,521	363	5	545	12	219
Other	4	1,410	10	—	—	—	52	86,711	1,254	488
New York State	56	14,991	515	30	5,001	402	120	81,095	4,390	5,495
Hospitals	3	2,097	61	—	—	—	22	30,966	743	279
Colleges	—	—	—	10	3,086	288	16	7,812	520	1,895
Other	53	12,894	454	20	1,915	114	82	42,317	3,127	3,321
New York City	5	3,358	68	11	47,392	4,368	68	206,774	6,322	5,960
Hospitals	2	2,945	59	—	—	—	18	30,211	1,140	380
Colleges	—	—	—	—	—	—	9	8,402	183	1,352
Other	3	413	9	11	47,392	4,368	41	168,161	4,999	4,228
Cities other than New York City	18	3,738	49	6	788	63	89	71,750	828	3,082
Hospitals	6	862	16	—	—	—	3	1,082	32	7
Colleges	—	—	—	4	356	60	—	—	—	—
Other	12	2,876	33	2	432	3	86	70,668	796	3,075
Towns and villages	185	8,528	250	54	2,545	54	111	91,853	716	8,232
Hospitals	—	—	—	—	—	—	5	1,066	48	10
Other	185	8,528	250	54	2,545	54	106	90,787	668	8,222
Federal	40	2,367	786	8	777	69	77	108,662	5,552	3,028
Hospitals	3	481	15	—	—	—	15	15,310	948	203
Colleges	—	—	—	—	—	—	1	266	7	33
Arsenals and navy yards	—	—	—	—	—	—	2	16,646	1,469	836
Other	37	1,886	771	8	777	69	59	76,440	3,128	1,956

Table 3. NUMBER OF ESTABLISHMENTS (1) WITH TECHNICAL OCCUPATIONS AND (2) WITH ENGINEERS OR SCIENTISTS, BY SIZE OF ESTABLISHMENT AND INDUSTRY DIVISION

(Including number of workers they employ, number in technical occupations, and number who are engineers and scientists)

Size of establishment (number of employees)	All establishments		Establishments with technical occupations			Establishments with engineers or scientists		
	Establishments	Employees	Establishments	Employees	Persons in technical occupations	Establishments	Employees	Engineers and scientists
All industries								
All sizes	393,516	6,227,656	14,595	2,550,734	148,684	14,437	2,539,357	142,732
1- 19	353,695	1,429,206	7,875	40,346	15,876	7,351	54,044	14,622
20- 49	24,040	740,370	2,138	65,706	9,706	2,332	71,194	8,595
50- 99	8,701	609,770	1,567	112,943	11,937	1,798	129,517	10,089
100- 199	3,513	489,190	1,052	150,527	11,447	1,063	152,049	8,635
200- 499	2,305	703,202	1,020	324,439	15,430	1,006	316,408	14,037
500- 999	687	475,675	477	331,576	15,936	457	317,727	14,881
1,000-1,999	340	477,892	261	369,326	16,096	237	333,638	16,091
2,000-4,999	162	472,774	136	400,500	18,801	124	365,403	19,236
5,000 or more	73	829,577	69	755,371	33,455	69	799,377	36,546
Manufacturing								
All sizes	48,017	1,876,160	3,590	903,311	59,085	4,576	938,384	54,563
1- 19	32,449	210,686	625	6,774	1,198	1,237	11,094	1,764
20- 49	8,781	276,236	977	29,469	2,879	1,092	33,115	2,937
50- 99	4,184	290,789	729	51,894	4,224	886	63,891	4,988
100- 199	1,383	191,206	462	67,113	3,512	534	77,118	2,829
200- 499	810	244,586	450	141,275	6,926	476	147,963	5,481
500- 999	221	153,515	178	125,474	6,402	180	126,896	6,065
1,000-1,999	115	156,419	98	134,979	6,964	103	140,425	7,182
2,000-4,999	53	155,906	50	149,516	7,543	47	141,065	7,648
5,000 or more	21	196,817	21	196,817	19,437	21	196,817	15,669
Construction								
All sizes	33,948	302,532	1,551	112,293	7,523	2,557	126,294	7,820
1- 19	31,445	115,064	485	6,207	1,443	1,354	13,669	2,577
20- 49	1,183	37,782	329	10,481	920	453	14,222	1,354
50- 99	927	65,576	474	35,256	2,333	482	35,952	1,631
100- 199	255	35,596	162	22,639	987	164	23,539	809
200- 499	119	33,509	85	24,535	1,110	86	24,495	690
500- 999	16	10,963	13	9,133	646	15	10,375	744
1,000-1,999	3	4,042	3	4,042	84	3	4,042	15
2,000-4,999	—	—	—	—	—	—	—	—
5,000 or more	—	—	—	—	—	—	—	—
Transportation, communication, and public utilities								
All sizes	13,075	469,627	378	260,029	14,084	254	243,381	4,728
1- 19	11,221	52,836	110	1,252	221	3	27	7
20- 49	1,001	31,270	75	2,359	281	64	2,294	194
50- 99	360	27,147	43	3,216	392	44	3,181	94
100- 199	204	29,088	39	5,946	668	34	4,596	141
200- 499	182	57,813	37	11,661	386	43	13,998	166
500- 999	40	27,455	20	13,337	939	19	12,347	240
1,000-1,999	31	51,933	21	38,058	1,620	18	33,920	393
2,000-4,999	28	86,436	25	78,551	3,933	21	67,369	1,414
5,000 or more	8	105,649	8	105,649	5,644	8	105,649	2,079
Private medical services								
All sizes	18,468	184,991	5,255	153,739	16,496	550	132,568	1,836
1- 19	17,821	37,419	4,758	12,961	7,442	173	1,029	273
20- 49	239	6,918	123	3,410	930	45	1,209	84
50- 99	94	6,601	72	5,130	728	48	3,418	99
100- 199	104	14,615	92	12,800	767	79	11,128	152
200- 499	117	38,038	117	38,038	1,761	114	37,113	308
500- 999	74	48,425	74	48,425	2,705	73	47,675	429
1,000-1,999	15	20,460	15	20,460	1,282	14	18,481	353
2,000-4,999	4	12,515	4	12,515	881	4	12,515	138
5,000 or more	—	—	—	—	—	—	—	—

Continued

Table 3. NUMBER OF ESTABLISHMENTS (1) WITH TECHNICAL OCCUPATIONS AND (2) WITH ENGINEERS OR SCIENTISTS, BY SIZE OF ESTABLISHMENT AND INDUSTRY DIVISION

(Including number of workers they employ, number in technical occupations, and number who are engineers and scientists)

Size of establishment (number of employees)	All establishments		Establishments with technical occupations			Establishments with engineers or scientists		
	Establishments	Employees	Establishments	Employees	Persons in technical occupations	Establishments	Employees	Engineers and scientists
Research, development, and testing laboratories; engineering and architectural services; business and management consulting services								
All sizes	4,653	63,067	1,566	44,722	14,749	1,959	46,243	14,780
1- 19	4,106	14,516	1,233	7,683	3,894	1,605	8,495	3,636
20- 49	341	10,358	181	5,452	2,437	197	5,834	1,718
50- 99	109	7,574	75	5,094	1,928	79	5,439	1,517
100- 199	55	7,406	44	5,947	1,929	43	5,780	1,665
200- 499	32	8,962	24	7,184	2,257	26	7,333	2,206
500- 999	3	2,407	2	1,518	332	2	1,518	381
1,000-1,999	5	6,710	5	6,710	853	5	6,710	2,112
2,000-4,999	2	5,134	2	5,134	1,119	2	5,134	1,545
5,000 or more	—	—	—	—	—	—	—	—
Private colleges and schools								
All sizes	2,066	112,937	89	51,114	3,754	730	93,595	16,607
1- 19	1,580	11,712	14	210	42	470	4,166	2,031
20- 49	256	7,902	25	736	120	99	3,029	726
50- 99	117	7,898	3	252	3	66	4,240	647
100- 199	44	6,229	16	2,313	70	33	4,698	1,042
200- 499	42	12,644	12	3,952	93	35	10,910	1,385
500- 999	11	8,597	8	6,338	469	11	8,597	1,297
1,000-1,999	6	7,392	4	4,521	222	6	7,392	926
2,000-4,999	6	15,622	4	10,768	1,076	6	15,622	3,036
5,000 or more	4	34,941	3	22,024	1,659	4	34,941	5,517
Government								
All sizes	3,108	874,593	846	688,348	21,063	648	710,816	31,894
1- 19	1,551	12,572	110	1,006	301	51	622	118
20- 49	581	17,224	162	5,505	835	81	2,708	476
50- 99	220	15.557	79	5,496	577	59	4,387	437
100- 199	227	31,731	102	14,651	952	80	11,601	1,228
200- 499	239	75,230	140	46,562	1,414	131	43,679	2,615
500- 999	130	93,196	111	78,979	3,038	109	77,003	4,737
1,000-1,999	89	125,758	79	109,839	4,612	76	105,922	4,448
2,000-4,999	42	118,298	36	97,572	3,103	33	89,667	4,717
5,000 or more	29	385,027	27	328,738	6,231	28	375,227	13,118
All other industries								
All sizes	270,181	2,343,749	1,320	337,178	11,930	3,163	248,076	10,504
1- 19	253,522	974,401	540	4,253	1,335	2,458	14,942	4,216
20- 49	11,658	352,680	266	8,294	1,304	301	8,783	1,106
50- 99	2,690	188,628	92	6,605	1,752	134	9,009	676
100- 199	1,241	173,319	135	19,118	2,562	96	13,589	769
200- 499	764	232,420	155	51,232	1,483	95	30,917	1,186
500- 999	192	131,117	71	48,372	1,405	48	33,316	988
1,000-1,999	76	105,178	36	50,717	459	12	16,746	662
2,000-4,999	27	78,863	15	46,444	1,146	11	34,031	738
5,000 or more	11	107,143	10	102,143	484	8	86,743	163

Table 4. NUMBER OF ESTABLISHMENTS (1) WITH TECHNICAL OCCUPATIONS BUT NO ENGINEERS OR SCIENTISTS, (2) WITH ENGINEERS OR SCIENTISTS BUT NO TECHNICAL OCCUPATIONS, AND (3) WITH BOTH, BY SIZE OF ESTABLISHMENT AND INDUSTRY DIVISION

(Including number of workers they employ, number in technical occupations, and number who are engineers and scientists)

Size of establishment (number of employees)	Establishments with technical occupations but no engineers or scientists			Establishments with engineers or scientists but no technical occupations			Establishments with both technical occupations and engineers or scientists			
	Establishments	Employees	Persons in technical occupations	Establishments	Employees	Engineers and scientists	Establishments	Employees	Persons in technical occupations	Engineers and scientists
All industries										
All sizes	7,862	347,184	24,387	7,704	335,807	25,575	6,733	2,203,550	124,297	117,157
1- 19	5,925	23,466	10,222	5,401	37,164	9,846	1,950	16,880	5,654	4,776
20- 49	869	27,289	3,618	1,063	32,777	3,235	1,269	38,417	6,088	5,360
50- 99	494	34,158	3,535	725	50,732	2,604	1,073	78,785	8,402	7,485
100- 199	254	35,975	3,230	265	37,497	1,479	798	114,552	8,217	7,156
200- 499	207	67,487	1,756	193	59,456	1,945	813	256,952	13,674	12,092
500- 999	54	36,563	774	34	22,714	762	423	295,013	15,162	14,119
1,000-1,999	38	53,119	492	14	17,431	387	223	316,207	15,604	15,704
2,000-4,999	19	53,727	733	7	18,630	250	117	346,773	18,068	18,986
5,000 or more	2	15,400	27	2	59,406	5,067	67	739,971	33,428	31,479
Manufacturing										
All sizes	1,064	74,371	3,537	2,050	109,444	4,060	2,526	828,940	55,548	50,503
1- 19	375	3,935	667	987	8,255	1,338	250	2,839	531	426
20- 49	362	11,306	1,097	477	14,952	934	615	18,163	1,782	2,003
50- 99	189	13,126	795	346	25,123	896	540	38,768	3,429	4,092
100- 199	69	10,444	258	141	20,449	276	393	56,669	3,254	2,553
200- 499	54	17,086	432	80	23,774	371	396	124,189	6,494	5,110
500- 999	9	5,672	158	11	7,094	145	169	119,802	6,244	5,920
1,000-1,999	3	4,351	5	8	9,797	100	95	130,628	6,959	7,082
2,000-4,999	3	8,451	125	—	—	—	47	141,065	7,418	7,648
5,000 or more	—	—	—	—	—	—	21	196,817	19,437	15,669
Construction										
All sizes	460	21,081	1,379	1,466	35,082	2,983	1,091	91,212	6,144	4,837
1- 19	171	1,763	492	1,040	9,225	1,663	314	4,444	951	914
20- 49	112	3,314	268	236	7,055	714	217	7,167	652	640
50- 99	137	8,981	474	145	9,677	343	337	26,275	1,859	1,288
100- 199	29	3,621	90	31	4,521	159	133	19,018	897	650
200- 499	11	3,402	55	12	3,362	63	74	21,133	1,055	627
500- 999	—	—	—	2	1,242	41	13	9,133	646	703
1,000-1,999	—	—	—	—	—	—	3	4,042	84	15
2,000-4,999	—	—	—	—	—	—	—	—	—	—
5,000 or more	—	—	—	—	—	—	—	—	—	—
Transportation, communication, and public utilities										
All sizes	247	31,382	1,475	123	14,734	508	131	228,647	12,609	4,220
1- 19	110	1,252	221	3	27	7	—	—	—	—
20- 49	63	2,041	253	52	1,976	182	12	318	28	12
50- 99	30	2,163	224	31	2,128	80	13	1,053	168	14
100- 199	21	3,187	246	16	1,837	97	18	2,759	422	44
200- 499	11	3,173	128	17	5,510	51	26	8,488	258	115
500- 999	3	2,105	63	2	1,115	6	17	11,232	876	234
1,000-1,999	5	6,279	57	2	2,141	85	16	31,779	1,563	308
2,000-4,999	4	11,182	283	—	—	—	21	67,369	3,650	1,414
5,000 or more	—	—	—	—	—	—	8	105,649	5,644	2,079
Private medical services										
All sizes	4,742	21,253	8,427	37	82	46	513	132,486	8,069	1,790
1- 19	4,622	12,014	7,038	37	82	46	136	947	404	227
20- 49	78	2,201	733	—	—	—	45	1,209	197	84
50- 99	24	1,712	318	—	—	—	48	3,418	410	99
100- 199	13	1,672	217	—	—	—	79	11,128	550	152
200- 499	3	925	20	—	—	—	114	37,113	1,741	308
500- 999	1	750	38	—	—	—	73	47,675	2,667	429
1,000-1,999	1	1,979	63	—	—	—	14	18,481	1,219	353
2,000-4,999	—	—	—	—	—	—	4	12,515	881	138
5,000 or more	—	—	—	—	—	—	—	—	—	—

Continued

Table 4. NUMBER OF ESTABLISHMENTS (1) WITH TECHNICAL OCCUPATIONS BUT NO ENGINEERS OR SCIENTISTS, (2) WITH ENGINEERS OR SCIENTISTS BUT NO TECHNICAL OCCUPATIONS, AND (3) WITH BOTH, BY SIZE OF ESTABLISHMENT AND INDUSTRY DIVISION

(Including number of workers they employ, number in technical occupations, and number who are engineers and scientists)

Size of establishment (number of employees)	Establishments with technical occupations but no engineers or scientists			Establishments with engineers or scientists but no technical occupations			Establishments with both technical occupations and engineers or scientists			
	Establishments	Employees	Persons in technical occupations	Establishments	Employees	Engineers and scientists	Establishments	Employees	Persons in technical occupations	Engineers and scientists
Research, development, and testing laboratories; engineering and architectural services; business and management consulting services										
All sizes	245	3,205	1,096	638	4,726	2,036	1,321	41,517	13,653	12,744
1- 19	226	1,049	695	598	1,861	1,212	1,007	6,634	3,199	2,424
20- 49	9	349	117	25	731	264	172	5,103	2,320	1,454
50- 99	3	216	73	7	561	198	72	4,878	1,855	1,319
100- 199	3	412	100	2	245	149	41	5,535	1,829	1,516
200- 499	4	1,179	111	6	1,328	213	20	6,005	2,146	1,993
500- 999	—	—	—	—	—	—	2	1,518	332	381
1,000-1,999	—	—	—	—	—	—	5	6,710	853	2,112
2,000-4,999	—	—	—	—	—	—	2	5,134	1,119	1,545
5,000 or more	—	—	—	—	—	—	—	—	—	—
Private colleges and schools										
All sizes	12	861	39	653	43,342	5,312	77	50,253	3,715	11,295
1- 19	—	—	—	456	3,956	1,919	14	210	42	112
20- 49	9	336	36	83	2,629	540	16	400	84	186
50- 99	—	—	—	63	3,988	641	3	252	3	6
100- 199	3	525	3	20	2,910	320	13	1,788	67	722
200- 499	—	—	—	23	6,958	458	12	3,952	93	927
500- 999	—	—	—	3	2,259	228	8	6,338	469	1,069
1,000-1,999	—	—	—	2	2,871	181	4	4,521	222	745
2,000-4,999	—	—	—	2	4,854	242	4	10,768	1,076	2,794
5,000 or more	—	—	—	1	12,917	783	3	22,024	1,659	4,734
Government										
All sizes	315	35,556	1,727	117	58,024	5,319	531	652,792	19,336	26,575
1- 19	88	738	223	29	354	57	22	268	78	61
20- 49	112	3,847	469	31	1,050	137	50	1,658	366	339
50- 99	47	3,175	337	27	2,066	98	32	2,321	240	339
100- 199	34	4,597	336	12	1,547	236	68	10,054	616	992
200- 499	23	7,555	94	14	4,672	446	117	39,007	1,320	2,169
500- 999	5	3,822	48	3	1,846	61	106	75,157	2,990	4,676
1,000-1,999	3	3,917	153	—	—	—	76	105,922	4,459	4,448
2,000-4,999	3	7,905	67	—	—	—	33	89,667	3,036	4,717
5,000 or more	—	—	—	1	46,489	4,284	27	328,738	6,231	8,834
All other industries										
All sizes	777	159,475	6,707	2,620	70,373	5,311	543	177,703	5,223	5,193
1- 19	333	2,715	886	2,251	13,404	3,604	207	1,538	449	612
20- 49	124	3,895	645	159	4,384	464	142	4,399	659	642
50- 99	64	4,785	1,314	106	7,189	348	28	1,820	438	328
100- 199	82	11,517	1,980	43	5,988	242	53	7,601	582	527
200- 499	101	34,167	916	41	13,852	343	54	17,065	567	843
500- 999	36	24,214	467	13	9,158	281	35	24,158	938	707
1,000-1,999	26	36,593	214	2	2,622	21	10	14,124	245	641
2,000-4,999	9	26,189	258	5	13,776	8	6	20,255	888	730
5,000 or more	2	15,400	27	—	—	—	8	86,743	457	163

Table 5. NUMBER OF ESTABLISHMENTS WITH RESEARCH AND DEVELOPMENT ACTIVITIES, BY INDUSTRY DIVISION

(Including number of workers they employ, number in technical occupations, and number who are engineers and scientists)

Research-and-development status of establishment	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
(A) All establishments:									
Establishments	393,516	48,017	33,948	13,075	18,468	4,653	2,066	3,108	270,181
Employees	6,227,656	1,876,160	302,532	469,627	184,991	63,067	112,937	874,593	2,343,749
Engineers and scientists	142,732	54,563	7,820	4,728	1,836	14,780	16,607	31,894	10,504
Persons in technical occupations	148,684	59,085	7,523	14,084	16,496	14,749	3,754	21,063	11,930
(B) Establishments with technical occupations or engineers or scientists:									
Establishments	22,299	5,640	3,017	501	5,292	2,204	742	963	3,940
Employees	2,886,541	1,012,755	147,375	274,763	153,821	49,448	94,456	746,372	407,551
Engineers and scientists	142,732	54,563	7,820	4,728	1,836	14,780	16,607	31,894	10,504
Persons in technical occupations	148,684	59,085	7,523	14,084	16,496	14,749	3,754	21,063	11,930
(C) Establishments with research and development:									
Establishments	4,133	2,436	94	6	156	441	49	144	807
Employees	1,090,481	658,618	5,862	14,617	66,395	24,121	47,378	212,576	60,914
Engineers and scientists	79,998	46,841	1,222	508	950	7,438	10,494	8,357	4,188
Persons in technical occupations	78,133	49,015	841	1,895	4,271	5,281	3,563	10,451	2,816
(D) Establishments with research and development (C), as a percent of all (A):									
Establishments	1.1	5.1	0.3	[b]	0.8	9.5	2.4	4.6	0.3
Employees	17.5	35.1	1.9	3.1	35.9	38.2	42.0	24.3	2.6
Engineers and scientists	56.0	85.8	15.6	10.7	51.7	50.3	63.2	26.2	39.9
Persons in technical occupations	52.5	83.0	11.2	13.5	25.9	35.8	94.9	49.6	23.6
(E) Establishments with research and development (C), as a percent of those with technical occupations or engineers or scientists (B):									
Establishments	18.5	43.2	3.1	1.2	2.9	20.0	6.6	15.0	20.5
Employees	37.8	65.0	4.0	5.3	43.2	48.8	50.2	28.5	14.9
Engineers and scientists	56.0	85.8	15.6	10.7	51.7	50.3	63.2	26.2	39.9
Persons in technical occupations	52.5	83.0	11.2	13.5	25.9	35.8	94.9	49.6	23.6

[a] Includes architectural as well as engineering service enterprises; research, development, and testing laboratories; and business and management consulting services.
[b] Less than 0.05 of a percent.

Table 6. NUMBER OF ESTABLISHMENTS (1) WITH TECHNICAL OCCUPATIONS, (2) WITH ENGINEERS OR SCIENTISTS, (3) WITH TECHNICAL OCCUPATIONS BUT NO ENGINEERS OR SCIENTISTS, (4) WITH ENGINEERS OR SCIENTISTS BUT NO TECHNICAL OCCUPATIONS, AND (5) WITH BOTH, BY AREA

(Including number of workers they employ, number in technical occupations, and number who are engineers and scientists)

Establishments with technical occupations and/or engineers or scientists	New York State	New York City	Nassau-Suffolk	Westchester	Albany	Binghamton	Buffalo	Rochester	Syracuse	Utica	All other
All establishments:											
Establishments	393,516	220,314	35,246	17,839	11,786	3,574	21,792	9,941	10,220	5,864	56,940
Employees	6,227,656	3,495,771	502,630	232,444	232,766	79,031	425,610	233,925	187,746	104,802	732,931
Establishments with technical occupations:											
Establishments	14,595	6,658	1,671	925	510	244	1,127	576	478	238	2,168
Employees	2,550,734	1,209,115	234,124	90,913	119,630	49,305	226,293	136,067	94,761	57,785	332,741
Persons in technical occupations	148,684	62,739	22,835	5,749	7,241	3,886	12,968	8,163	5,490	2,890	16,723
Establishments with engineers and scientists:											
Establishments	14,437	6,889	1,659	1,037	462	105	1,255	402	571	168	1,889
Employees	2,539,357	1,196,080	234,469	94,849	119,718	44,946	234,290	135,204	99,464	55,067	325,270
Engineers and scientists	142,732	58,318	18,158	5,593	8,398	2,552	13,576	8,118	7,239	2,766	18,014
Establishments with technical occupations but no engineers or scientists:											
Establishments	7,862	3,765	863	465	280	175	505	349	267	152	1,041
Employees	347,184	221,970	20,300	14,446	15,102	5,565	13,243	11,302	6,372	6,716	32,168
Persons in technical occupations	24,387	12,639	1,956	1,033	1,152	508	1,720	1,196	870	474	2,839
Establishments with engineers or scientists but no technical occupations:											
Establishments	7,704	3,996	851	577	232	36	633	175	360	82	762
Employees	335,807	208,935	20,645	18,382	15,190	1,206	21,240	10,439	11,075	3,998	24,697
Engineers and scientists	25,575	16,384	1,579	1,198	805	54	2,148	456	991	228	1,732
Establishments with both technical occupations and engineers or scientists:											
Establishments	6,733	2,893	808	460	230	69	622	227	211	86	1,127
Employees	2,203,550	987,145	213,824	76,467	104,528	43,740	213,050	124,765	88,389	51,069	300,573
Persons in technical occupations	124,297	50,100	20,879	4,716	6,089	3,378	11,248	6,967	4,620	2,416	13,884
Engineers and scientists	117,157	41,934	16,579	4,395	7,593	2,498	11,428	7,662	6,248	2,538	16,282

Table 7. NUMBER IN HOURLY-RATED AND IN SALARIED TECHNICAL OCCUPATIONS AND NUMBER EARNING LESS THAN $2.00 AN HOUR OR $75 A WEEK, BY OCCUPATION GROUP

Technical occupation group	Number in technical occupations							
	In all establishments		In establishments whose technical occupations are—					
			Hourly-rated		Salaried		Hourly and salaried	
	Total	Earning under $2 or $75	Total	Earning under $2	Total	Earning under $75	Total	Earning under $2 or $75
All technical occupations	148,684	5,477	33,068	1,687	113,801	3,616	1,815	174
Draftsmen	20,972	509	4,376	215	16,489	284	107	10
Structural design technicians and related specialists	2,516	7	287	5	2,229	2	—	—
Electro and mechanical engineering technicians	42,031	353	14,382	230	26,906	114	743	9
Electronic	10,791	134	5,475	129	4,934	5	382	—
Electrical	8,794	173	3,142	90	5,552	79	100	4
Mechanical	8,461	27	2,414	7	5,887	17	160	3
Electro-mechanical	13,985	19	3,351	4	10,533	13	101	2
Mathematics technicians	831	22	210	3	621	19	—	—
Physical science technicians	8,969	205	1,652	136	7,217	69	100	—
Biological, medical, dental, and related science technicians	25,445	3,849	2,866	847	22,321	2,859	258	143
Industrial engineering technicians and related specialists	6,901	53	1,521	26	5,294	27	86	—
Civil engineering and construction technicians and specialists	13,464	79	1,209	34	12,157	45	98	—
Sales and service technicians	1,932	16	75	3	1,825	13	32	—
Technical writing and illustration specialists	3,034	18	831	10	1,984	—	219	8
Safety and sanitation inspectors and related specialists	4,084	23	13	—	4,050	23	21	—
Product testing and inspection specialists	8,059	306	5,024	170	2,900	132	135	4
Data-processing systems analysis and programming specialists	6,153	4	164	—	5,973	4	16	—
Airway tower specialists and flight dispatchers	1,373	—	29	—	1,344	—	—	—
Broadcasting, motion picture, and recording studio specialists	2,920	33	429	8	2,491	25	—	—

Table 8. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY AREA

Technical occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
All technical occupations	148,684	62,739	22,835	5,749	7,241	3,886	12,968	8,163	5,490	2,890	16,723
I. Draftsmen	20,972	10,432	2,459	817	774	528	1,978	978	795	236	1,975
A. Architectural and structural	6,294	4,493	338	204	210	18	306	168	119	36	402
1. Construction	5,973	4,275	251	204	210	18	290	168	119	36	402
a. Architectural	3,508	2,614	134	159	91	14	151	77	66	33	169
b. Structural	1,955	1,339	95	38	77	4	92	70	31	3	206
c. Combination: architectural and structural	510	322	22	7	42	—	47	21	22	—	27
2. Aircraft structures	105	2	87	—	—	—	16	—	—	—	—
3. Ship structures	216	216	—	—	—	—	—	—	—	—	—
B. Electrical-electronic	2,301	1,394	335	78	38	21	188	91	68	9	79
1. Construction	684	625	6	8	23	8	9	—	2	—	3
2. Other	1,617	769	329	70	15	13	179	91	66	9	76
C. Mechanical	6,526	2,346	703	327	142	44	1,147	517	240	53	1,007
1. Construction	1,020	718	15	125	31	9	59	2	16	—	45
2. Other	5,506	1,628	688	202	111	35	1,088	515	224	53	962
D. Electro-mechanical	3,767	1,166	865	113	222	313	192	117	341	126	312
1. Construction	211	75	18	—	10	16	40	11	27	—	14
2. Other	3,556	1,091	847	113	212	297	152	106	314	126	298
E. Highway, street, and related construction	270	86	44	6	103	17	—	—	—	3	11
F. Map, topographical, and geological	592	235	129	64	22	13	41	20	14	1	53
G. Plant layout	422	209	2	12	5	—	72	61	8	5	48
H. General draftsmen	661	382	39	13	30	102	29	4	3	3	56
I. Draftsmen n.e.c.	139	121	4	—	2	—	3	—	2	—	7
II. Structural design technicians and related specialists	2,516	1,748	528	47	45	5	55	5	50	—	33
A. Construction	2,004	1,660	114	47	45	5	48	5	50	—	30
1. Architectural	349	299	14	10	1	2	6	3	14	—	—
2. Structural	337	279	9	4	5	—	32	—	8	—	—
3. Combination: architectural and structural	71	54	1	—	—	—	2	2	—	—	12
4. Electrical	186	171	9	6	—	—	—	—	—	—	—
5. Mechanical	467	429	14	19	2	—	3	—	—	—	—
6. Combination: electrical and mechanical	162	69	55	7	—	3	—	—	28	—	—
7. Highway, street, and related construction n.e.c.	76	58	12	1	—	—	5	—	—	—	—
8. General construction	356	301	—	—	37	—	—	—	—	—	18
B. Aircraft structure	427	3	414	—	—	—	7	—	—	—	3
1. Design[a]	261	—	—	—	—	—	—	—	—	—	—
2. Lofting[a]	166	—	—	—	—	—	—	—	—	—	—
C. Ship structure	85	85	—	—	—	—	—	—	—	—	—
1. Design	28	28	—	—	—	—	—	—	—	—	—
2. Lofting	57	57	—	—	—	—	—	—	—	—	—

Continued

Table 8. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY AREA

Technical occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
III. Electro and mechanical engineering technicians	42,031	13,894	10,082	1,312	2,010	1,763	3,149	2,315	1,758	1,171	4,577
A. Field	42,031	13,894	10,082	1,312	2,010	1,763	3,149	2,315	1,758	1,171	4,577
1. Electronic	10,791	2,912	3,815	314	280	450	503	75	508	701	1,233
2. Electrical	3,618	1,584	298	80	233	164	435	290	125	4	405
3. Electronic-electrical	5,176	2,401	951	224	157	35	448	290	261	107	302
4. Mechanical	8,461	2,260	1,680	155	603	346	917	875	257	113	1,255
5. Electronic-mechanical	12,709	4,232	2,856	495	735	720	829	762	543	236	1,301
6. Electrical-mechanical	1,276	505	482	44	2	48	17	23	64	10	81
B. Product or equipment worked on	42,031	13,894	10,082	1,312	2,010	1,763	3,149	2,315	1,758	1,171	4,577
1. Instruments and electronic and science laboratory equipment	23,090	4,797	7,651	637	1,010	1,538	1,311	1,418	1,016	910	2,802
a. Electronic equipment and instruments	15,845	3,302	4,587	586	667	1,077	906	629	954	884	2,253
(1) Communications equipment	4,673	1,908	1,547	143	94	70	116	69	223	325	178
(a) Radio, television, audio	1,694	689	619	41	85	6	19	4	34	68	129
(b) Radar, sonar, microwave	1,133	252	666	2	—	—	47	—	48	118	—
(c) Other and combinations	1,846	967	262	100	9	64	50	65	141	139	49
(2) Digital computers	5,045	658	625	116	279	851	320	173	171	221	1,631
(3) Testing, measuring, and control instruments	1,725	387	627	70	29	84	125	42	135	68	158
(4) Electronic components	1,577	186	538	114	206	68	89	—	98	44	234
(5) General and other	2,825	163	1,250	143	59	4	256	345	327	226	52
b. Electronic-mechanical instruments	4,629	929	2,198	46	130	415	255	154	13	26	463
(1) Industrial servo-control instruments, fire control, guidance, and other analog applications	2,791	275	1,596	10	28	263	196	—	—	3	420
(2) Testing, measuring, and control instruments, other than servo	1,173	455	210	36	79	116	58	154	12	23	30
(3) General and other	665	199	392	—	23	36	1	—	1	—	13
c. Mechanical instruments	1,470	293	303	5	39	46	131	581	13	—	59
(1) Testing, measuring, and control instruments	655	165	288	1	39	11	116	1	7	—	27
(a) General	427	129	179	—	39	11	45	1	—	—	23
(b) Hydraulic, pneumatic, and other	228	36	109	1	—	—	71	—	7	—	4
(2) Optical and photographic instruments	633	25	11	1	—	5	11	572	—	—	8
(3) General and other	182	103	4	3	—	30	4	8	6	—	24
d. Science laboratory equipment n.e.c.	1,146	273	563	—	174	—	19	54	36	—	27
(1) Chemical laboratory[a]	34	—	—	—	—	—	—	—	—	—	—
(2) Physics laboratory, nuclear[a]	742	—	—	—	—	—	—	—	—	—	—
(3) Physics laboratory, other[a]	64	—	—	—	—	—	—	—	—	—	—
(4) Biological or medical laboratory[a]	44	—	—	—	—	—	—	—	—	—	—
(5) General[a]	262	—	—	—	—	—	—	—	—	—	—
2. Machinery, electrical and mechanical equipment	15,223	7,432	1,323	655	835	205	1,446	774	667	215	1,671
a. Electrical equipment	10,981	6,139	641	530	757	74	987	456	438	98	861
(1) Telephone, teletype, and related equipment	6,057	3,904	489	374	141	24	248	253	149	53	422
(2) Electric power plant equipment	1,709	829	40	—	431	9	296	31	44	—	29
(3) Electrical control and signaling equipment	1,441	817	40	40	60	17	164	80	88	39	96

Continued

Table 8. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY AREA

Technical occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
III. Electro and mechanical engineering technicians (continued)											
(4) Electrical equipment, parts, and components n.e.c.	1,499	477	70	110	124	24	242	51	85	6	310
(5) Combination: control, signaling, and other equipment n.e.c.	275	112	2	6	1	—	37	41	72	—	4
b. Nonelectrical machinery and other metal equipment	4,242	1,293	682	125	78	131	459	318	229	117	810
(1) Tool and die	1,833	358	364	60	47	119	231	148	89	45	372
(2) Manufacturing and mining machinery and equipment n.e.c.	1,089	212	247	50	23	8	79	111	103	43	213
(3) Chemical processing machinery and equipment	335	99	14	—	8	—	86	21	4	6	97
(4) Construction machinery and equipment	15	5	—	—	—	—	—	—	—	—	10
(5) Agricultural machinery and equipment	21	—	—	—	—	—	—	—	—	—	21
(6) Warehouse and other material moving machinery equipment	56	15	3	—	—	—	—	—	—	—	38
(7) Heating, air conditioning, and related machinery and equipment	451	339	36	—	—	—	40	3	23	6	4
(8) General and other	442	265	18	15	—	4	23	35	10	17	55
3. Transportation equipment, aircraft, and ordnance	3,372	1,486	1,046	16	133	—	376	118	70	45	82
a. Aircraft and missile parts and equipment n.e.c.	2,784	1,330	1,030	10	33	—	262	—	58	40	21
(1) Aircraft electronic-electrical systems n.e.c.[a]	996	—	—	—	—	—	—	—	—	—	—
(2) Jet engine[a]	76	—	—	—	—	—	—	—	—	—	—
(3) Rocket engine[a]	111	—	—	—	—	—	—	—	—	—	—
(4) Other aircraft engine[a]	34	—	—	—	—	—	—	—	—	—	—
(5) Aircraft mechanical equipment and systems[a]	233	—	—	—	—	—	—	—	—	—	—
(6) Missile equipment[a]	280	—	—	—	—	—	—	—	—	—	—
(7) General[a]	1,054	—	—	—	—	—	—	—	—	—	—
b. Transportation vehicles and equipment n.e.c.	508	140	—	6	70	—	108	115	12	—	57
(1) Ships and ship equipment	110	110	—	—	—	—	—	—	—	—	—
(2) Motor vehicles and equipment	285	20	—	6	—	—	100	114	7	—	38
(3) Railroad vehicles and equipment	113	10	—	—	70	—	8	1	5	—	19
c. Ordnance	80	16	16	—	30	—	6	3	—	5	4
4. Other products and equipment	346	179	62	4	32	20	16	5	5	1	22
a. Nonmetal cartons and containers	114	87	—	—	—	—	5	3	—	—	19
b. Other	232	92	62	4	32	20	11	2	5	1	3
C. Function	42,031	13,894	10,082	1,312	2,010	1,763	3,149	2,315	1,758	1,171	4,577
1. Design	7,689	1,761	1,776	129	749	347	691	588	389	154	1,105
2. Development	6,803	1,543	2,227	135	195	188	657	681	365	226	586
3. Installation	458	360	22	28	—	—	26	—	—	—	22
4. Troubleshooting and related functions	18,880	7,658	4,114	593	716	797	1,275	543	745	684	1,755
5. Combination of design and development	1,392	265	297	125	72	154	33	52	36	2	356
6. Combination of design and/or development and installing and/or troubleshooting	3,741	1,095	927	113	154	179	286	303	70	62	552
7. Combination of installing and troubleshooting	3,068	1,212	719	189	124	98	181	148	153	43	201

Continued

Table 8. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY AREA

Technical occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
IV. Mathematics technicians	831	156	466	12	79	6	47	16	25	—	24
V. Physical science technicians	8,969	1,937	393	457	761	268	1,798	1,333	323	87	1,612
A. Chemical and related	5,162	1,251	139	440	332	80	1,159	315	188	27	1,231
1. Pharmaceuticals	363	85	—	117	26	—	7	—	—	—	128
2. Fuels	338	56	—	—	—	—	54	2	—	—	226
3. Beverages and other food products	478	114	—	87	6	—	44	12	28	—	187
4. Industrial and other chemicals	3,983	996	139	236	300	80	1,054	301	160	27	690
B. Metallurgical and related	987	96	153	11	146	11	227	108	100	39	96
C. Physics-chemical	1,638	117	13	6	90	146	361	701	—	—	204
D. Physics, radiation, and nuclear	761	221	81	—	150	24	32	201	27	3	22
E. Meteorology	185	146	5	—	1	6	13	6	8	—	—
F. Minerals and soil	140	19	—	—	37	—	6	1	—	18	59
G. Other	96	87	2	—	5	1	—	1	—	—	—
VI. Biological, medical, dental, and related science technicians	25,445	14,107	1,905	1,023	1,075	278	1,853	1,209	837	315	2,843
A. Agricultural and related	340	22	17	1	23	2	40	15	9	—	211
B. Biological and medical laboratory	9,898	5,914	597	303	396	66	733	555	375	71	888
1. Bacteriology (microbiology)	727	341	38	50	29	1	52	34	48	2	132
2. Biochemistry	837	510	32	18	24	7	62	53	32	2	97
3. Tissue (histology)	428	284	28	10	8	2	35	2	18	3	38
4. Cytology	122	100	5	—	3	—	6	—	1	2	5
5. Hematology	617	365	23	9	23	1	63	60	21	2	50
6. Blood bank	380	265	16	9	7	3	23	15	17	1	24
7. Serology	106	65	15	3	3	—	8	—	—	1	11
8. General and other	6,681	3,984	440	204	299	52	484	391	238	58	531
C. General medical assistants, doctor's office (other than nurse or secretary)	1,114	570	150	133	35	20	47	37	40	23	59
D. X-ray and related equipment technicians	3,013	1,623	198	145	120	42	285	114	63	48	375
E. Other medical technicians	1,801	1,053	61	43	123	6	244	94	27	5	145
1. Electrocardiograph	548	325	22	24	28	3	36	48	16	4	42
2. Electroencephalograph	159	106	7	6	4	—	23	2	5	—	6
3. Inhalation therapy	153	111	3	2	1	2	13	9	1	—	11
4. Other	941	511	29	11	90	1	172	35	5	1	86
F. Therapists	1,883	1,175	96	70	100	23	101	54	7	31	226
1. Physical	1,003	632	38	37	65	11	58	19	6	19	118
2. Occupational, recreational, and other	880	543	58	33	35	12	43	35	1	12	108
G. Medical record librarians	347	185	30	19	13	6	17	9	2	1	65
H. Dental laboratory technicians	2,844	1,963	193	120	171	21	137	77	23	31	108
1. Ceramists	216	177	11	1	1	—	8	2	3	11	2
2. Dental mechanics	2,628	1,786	182	119	170	21	129	75	20	20	106
I. Dental hygienists	1,874	536	211	65	45	85	161	160	153	35	423
J. Dental assistants	2,331	1,066	352	124	49	7	88	94	138	70	343

Continued

Table 8. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY AREA

Technical occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
VII. Industrial engineering technicians and related specialists	6,901	1,685	1,218	134	602	251	726	504	300	259	1,222
A. Industrial engineering technicians	2,224	323	257	70	167	80	338	223	123	137	506
1. Time and motion study men and standards setters	1,104	53	44	48	100	31	220	121	83	102	302
2. Industrial process methods men	825	149	129	22	67	38	105	98	36	16	165
3. General	295	121	84	—	—	11	13	4	4	19	39
B. Quality control and reliability technicians	1,279	231	189	21	168	55	152	132	98	29	204
C. Production planners, estimators, and related specialists	2,918	814	706	43	257	112	216	147	56	89	478
1. Production planners	993	190	388	7	197	16	35	6	18	6	130
2. Production cost estimators	395	89	86	11	—	31	40	28	17	2	91
3. Production schedulers, coordinators, and expediters	515	131	114	8	12	24	124	4	8	2	88
4. Parts, equipment, and materials estimators, standardizers, coordinators, and catalogers	623	162	107	—	48	39	12	17	13	74	151
5. General	392	242	11	17	—	2	5	92	—	5	18
D. Equipment specialists	480	317	66	—	10	4	20	2	23	4	34
1. Electro equipment and systems	132	102	1	—	2	3	—	—	16	—	8
2. Industrial machinery, equipment, and tools	39	6	7	—	1	1	10	1	—	1	12
3. Ship and marine equipment	57	56	—	—	—	—	—	—	—	—	1
4. Aircraft, missiles, and automotive equipment	26	18	1	—	—	—	—	—	—	—	7
5. Ordnance	44	44	—	—	—	—	—	—	—	—	—
6. General and other	182	91	57	—	7	—	10	1	7	3	6
VIII. Civil engineering and construction technicians and specialists	13,464	5,590	1,411	912	760	371	1,423	543	462	225	1,767
A. Surveyors and related specialists	2,381	756	416	176	56	48	204	77	66	13	569
1. Surveyors	1,171	314	237	115	20	34	78	28	41	3	301
2. Instrumentmen	1,007	383	162	40	24	9	106	23	25	6	229
3. General and other	203	59	17	21	12	5	20	26	—	4	39
B. Civil engineering and construction technicians	4,932	1,893	422	356	315	151	401	242	216	187	749
1. Buildings	1,765	1,104	145	207	1	16	127	30	56	—	79
2. Highway, street, and other heavy construction	983	471	35	107	23	1	38	92	13	7	196
3. General and other	2,184	318	242	42	291	134	236	120	147	180	474
C. Construction inspectors	2,804	1,428	418	134	175	13	255	115	55	11	200
1. Building structures	1,126	534	126	64	154	3	87	24	11	7	116
2. Electrical and mechanical equipment	498	421	2	1	3	—	45	—	18	1	7
3. Plumbing	214	88	37	18	4	1	18	5	8	2	33
4. Heating, air conditioning, and related equipment	54	29	—	—	—	—	2	—	3	—	20
5. General and other	912	356	253	51	14	9	103	86	15	1	24
D. Construction specification writers and cost estimators	3,347	1,513	155	246	214	159	563	109	125	14	249
1. Specification writers	117	48	1	—	52	—	1	1	7	3	4
a. Architectural and structural	72	47	1	—	20	—	1	1	—	—	2
b. Mechanical and electrical	25	1	—	—	24	—	—	—	—	—	—
c. Highway, street, and related construction	20	—	—	—	8	—	—	—	7	3	2

Continued

Table 8. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY AREA

Technical occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
VIII. Civil engineering and construction technicians and specialists (continued)											
2. Cost estimators	2,898	1,438	152	169	142	159	512	108	68	—	150
a. Architectural and structural	1,426	707	53	62	79	66	364	26	43	—	26
b. Mechanical and electrical	841	507	28	56	48	70	90	30	2	—	10
c. Highway, street, and related construction	361	109	71	51	—	23	32	39	3	—	33
d. General	270	115	—	—	15	—	26	13	20	—	81
3. Combination: specification writers and cost estimators	332	27	2	77	20	—	50	—	50	11	95
a. Architectural and structural	92	13	2	77	—	—	—	—	—	—	—
b. Mechanical and electrical	161	—	—	—	16	—	49	—	50	11	35
c. Highway, street, and related construction	64	—	—	—	4	—	—	—	—	—	60
d. General and other	15	14	—	—	—	—	1	—	—	—	—
IX. Sales and service technicians	1,932	1,101	281	58	17	30	124	103	32	3	183
X. Technical writing and illustration specialists	3,034	1,588	797	20	55	64	151	70	108	78	103
A. Technical writers and related specialists	1,906	1,071	499	9	39	23	86	59	54	34	32
1. Technical writers and editors	1,669	895	473	9	26	23	77	57	54	30	25
2. Specifications writers, other than construction	237	176	26	—	13	—	9	2	—	4	7
B. Technical illustrators	1,082	495	282	11	12	41	62	11	54	44	70
C. General and other	46	22	16	—	4	—	3	—	—	—	1
XI. Safety and sanitation inspectors and related specialists	4,084	2,367	200	60	199	61	287	129	100	93	588
A. Industrial safety and fire prevention	2,253	1,309	109	16	106	48	143	76	48	77	321
B. Sanitation	1,771	1,010	85	44	91	13	144	51	52	14	267
C. Air safety	60	48	6	—	2	—	—	2	—	2	—
XII. Product testing and inspection specialists	8,059	1,667	2,255	570	462	99	808	537	355	125	1,181
A. Instruments, meters, and related equipment	2,335	501	925	162	33	83	113	151	142	74	151
1. Testing, measuring, and control instruments	1,958	444	880	142	8	64	94	59	125	64	78
a. Electronic-electrical	1,659	412	786	117	2	36	66	9	118	63	50
b. General and other n.e.c.	299	32	94	25	6	28	28	50	7	1	28
2. Optical and photographic	145	24	20	4	—	17	—	77	—	—	3
3. Water, electric, and gas meters	64	33	—	8	12	—	—	—	5	2	4
4. Weights and measures	168	—	25	8	13	2	19	15	12	8	66
B. Machinery, transportation and other metal equipment, and appliances n.e.c.	2,762	273	1,214	242	247	6	200	149	124	11	296
1. Industrial machinery and equipment	755	61	133	203	122	—	79	47	30	2	78
a. Electronic-electrical	362	12	4	144	43	—	76	38	1	2	42
b. General and other n.e.c.	393	49	129	59	79	—	3	9	29	—	36
2. Aircraft equipment	998	55	901	1	—	—	—	—	—	—	41
3. Automotive equipment	152	14	—	4	12	—	3	—	69	—	50
4. Office equipment	139	34	—	—	4	—	—	81	6	—	14

Continued

Table 8. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY AREA

Technical occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
XII. Product testing and inspection specialists (continued)											
5. Household appliances	112	47	4	4	2	—	15	20	5	3	12
6. Military equipment	86	—	—	—	86	—	—	—	—	—	—
7. Metal castings, machined parts, and related materials	520	62	176	30	21	6	103	1	14	6	101
C. Chemical and other nonmetal products n.e.c.	1,926	573	49	123	135	5	358	161	26	—	496
1. Chemical and related products	846	256	2	71	17	2	220	110	—	—	168
a. Chemical and petroleum	377	111	—	60	—	—	116	30	—	—	60
b. Other	469	145	2	11	17	2	104	80	—	—	108
2. Construction materials	216	84	7	4	24	—	36	12	6	—	43
3. Paper and related products	315	18	21	—	42	—	58	9	20	—	147
a. Paper and pulp	239	1	8	—	20	—	54	9	2	—	145
b. Wood and other	76	17	13	—	22	—	4	—	18	—	2
4. Rubber and plastic products	166	44	19	21	15	—	32	20	—	—	15
5. Textiles and related products	314	171	—	27	37	3	4	10	—	—	62
a. Cloth	170	129	—	6	35	—	—	—	—	—	—
b. Other	144	42	—	21	2	3	4	10	—	—	62
6. Other	69	—	—	—	—	—	8	—	—	—	61
D. Food and agricultural products	563	134	14	39	37	5	49	72	46	28	139
1. Milk and milk products	307	62	—	—	8	5	28	4	40	28	132
2. General and other	256	72	14	39	29	—	21	68	6	—	7
E. Industrial X-ray and related processes	308	102	53	—	8	—	53	1	16	12	63
1. Industrial X-ray and radiography	223	86	35	—	4	—	33	—	2	3	60
2. General and other	85	16	18	—	4	—	20	1	14	9	3
F. General and other	165	84	—	4	2	—	35	3	1	—	36
XIII. Data-processing systems analysis and programming specialists	6,153	3,673	297	278	263	120	323	321	250	206	422
A. Systems analysts	1,875	1,012	76	76	104	10	123	139	140	86	109
B. Programmers	3,205	1,861	200	133	143	109	126	154	104	98	277
1. Business and accounting	2,301	1,562	37	118	17	62	74	67	84	91	189
2. Engineering and scientific	553	118	157	7	71	46	50	13	10	—	81
3. Combination: business and engineering	351	181	6	8	55	1	2	74	10	7	7
C. Combination: systems analysis and programming	936	686	19	64	14	1	68	28	6	22	28
D. Project planners	137	114	2	5	2	—	6	—	—	—	8
XIV. Airway tower specialists and flight dispatchers	1,373	536	516	25	34	19	74	31	18	55	65
A. Airway tower specialists	1,145	317	516	25	34	19	74	31	18	46	65
B. Flight dispatchers	228	219	—	—	—	—	—	—	—	9	—

Continued

Table 8. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY AREA

Technical occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
XV. Broadcasting, motion picture, and recording studio specialists	2,920	2,258	27	24	105	23	172	69	77	37	128
A. Studio technicians	1,521	1,270	6	—	48	12	88	43	15	8	31
1. Technical directors	96	87	—	—	3	—	6	—	—	—	—
2. Light	87	78	—	—	9	—	—	—	—	—	—
3. Audio and acoustics	194	163	3	—	3	—	3	3	—	2	17
4. Sound effects	61	61	—	—	—	—	—	—	—	—	—
5. Video control	36	31	—	—	3	—	2	—	—	—	—
6. Recording	234	231	—	—	2	—	—	1	—	—	—
7. Studio field	713	586	—	—	23	11	23	38	14	6	12
8. General	100	33	3	—	5	1	54	1	1	—	2
B. Video tape and kinescope technicians	194	179	—	11	3	—	—	1	—	—	—
C. Equipment and maintenance technicians	1,205	809	21	13	54	11	84	25	62	29	97
1. Transmitter	431	192	21	8	27	6	26	20	40	29	62
2. Transmission	111	100	—	—	4	—	3	4	—	—	—
3. Maintenance	315	295	—	—	6	2	3	—	—	—	9
4. General	348	222	—	5	17	3	52	1	22	—	26

[a] Area data omitted.

Table 9. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

Technical occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
All technical occupations	148,684	59,085	7,523	14,084	16,496	14,749	3,754	21,063	11,930
I. Draftsmen	20,972	9,357	1,163	1,055	5	6,923	67	1,072	1,330
A. Architectural and structural	6,294	808	436	141	2	4,115	8	451	333
1. Construction	5,973	660	436	136	2	3,947	8	451	333
a. Architectural	3,508	155	85	4	—	3,032	2	38	192
b. Structural	1,955	452	314	13	—	784	—	313	79
c. Combination: architectural and structural	510	53	37	119	2	131	6	100	62
2. Aircraft structures	105	103	—	2	—	—	—	—	—
3. Ship structures	216	45	—	3	—	168	—	—	—
B. Electrical-electronic	2,301	999	103	589	—	446	11	93	60
1. Construction	684	12	103	304	—	238	—	23	4
2. Other	1,617	987	—	285	—	208	11	70	56
C. Mechanical	6,526	4,565	545	23	—	845	44	101	403
1. Construction	1,020	17	505	19	—	433	—	27	19
2. Other	5,506	4,548	40	4	—	412	44	74	384
D. Electro-mechanical	3,767	2,505	24	226	2	654	1	66	289
1. Construction	211	9	24	104	—	74	—	—	—
2. Other	3,556	2,496	—	122	2	580	1	66	289
E. Highway, street, and related construction	270	—	9	8	—	120	—	133	—
F. Map, topographical, and geological	592	95	—	42	—	302	1	102	50
G. Plant layout	422	254	—	—	1	46	2	5	114
H. General draftsmen	661	24	46	26	—	374	—	114	77
I. Draftsmen n.e.c.	139	107	—	—	—	21	—	7	4
II. Structural design technicians and related specialists	2,516	495	329	83	—	1,339	5	126	139
A. Construction	2,004	68	329	80	—	1,314	5	69	139
1. Architectural	349	2	26	—	—	278	—	18	25
2. Structural	337	7	48	77	—	189	—	—	16
3. Combination: architectural and structural	71	8	—	—	—	63	—	—	—
4. Electrical	186	14	24	—	—	148	—	—	—
5. Mechanical	467	21	74	—		372	—	—	—
6. Combination: electrical and mechanical	162	—	—	—	—	162	—	—	—
7. Highway, street, and related construction n.e.c.	76	—	6	—	—	63	—	7	—
8. General construction	356	16	151	3	—	39	5	44	98
B. Aircraft structure	427	427	—	—	—	—	—	—	—
1. Design	261	261	—	—	—	—	—	—	—
2. Lofting	166	166	—	—	—	—	—	—	—
C. Ship structure	85	—	—	3	—	25	—	57	—
1. Design	28	—	—	3	—	25	—	—	—
2. Lofting	57	—	—	—	—	—	—	57	—

Continued

Table 9. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

Technical occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
III. Electro and mechanical engineering technicians	42,031	23,632	154	8,911	13	2,163	583	2,506	4,069
A. Field	42,031	23,632	154	8,911	13	2,163	583	2,506	4,069
1. Electronic	10,791	7,840	2	390	3	704	148	1,049	655
2. Electrical	3,618	1,783	—	1,038	—	294	78	387	38
3. Electronic-electrical	5,176	1,763	—	2,556	—	47	45	665	100
4. Mechanical	8,461	6,503	152	380	9	558	272	217	370
5. Electronic-mechanical	12,709	4,930	—	4,317	1	505	33	143	2,780
6. Electrical-mechanical	1,276	813	—	230	—	55	7	45	126
B. Product or equipment worked on	42,031	23,632	154	8,911	13	2,163	583	2,506	4,069
1. Instruments and electronic and science laboratory equipment	23,090	15,735	20	1,138	13	990	458	1,244	3,492
a. Electronic equipment and instruments	15,845	10,804	2	559	2	545	68	1,057	2,808
(1) Communications equipment	4,673	2,704	2	482	—	169	—	966	350
(a) Radio, television, audio	1,694	1,016	—	293	—	18	—	195	172
(b) Radar, sonar, microwave	1,133	845	2	4	—	78	—	204	—
(c) Other and combinations	1,846	843	—	185	—	73	—	567	178
(2) Digital computers	5,045	2,600	—	—	—	40	5	—	2,400
(3) Testing, measuring, and control instruments	1,725	1,554	—	62	—	84	—	19	6
(4) Electronic components	1,577	1,508	—	—	—	59	—	1	9
(5) General and other	2,825	2,438	—	15	2	193	63	71	43
b. Electronic-mechanical instruments	4,629	3,774	—	518	—	214	2	100	21
(1) Industrial servo-control instruments, fire control, guidance, and other analog applications	2,791	2,637	—	—	—	72	—	82	—
(2) Testing, measuring, and control instruments, other than servo	1,173	595	—	518	—	54	—	3	3
(3) General and other	665	542	—	—	—	88	2	15	18
c. Mechanical instruments	1,470	1,141	18	61	—	85	12	53	100
(1) Testing, measuring, and control instruments	655	440	18	61	—	18	—	29	89
(a) General	427	249	18	61	—	16	—	29	54
(b) Hydraulic, pneumatic and other	228	191	—	—	—	2	—	—	35
(2) Optical and photographic instruments	633	619	—	—	—	4	—	—	10
(3) General and other	182	82	—	—	—	63	12	24	1
d. Science laboratory equipment n.e.c.	1,146	16	—	—	11	146	376	34	563
(1) Chemical laboratory	34	—	—	—	—	—	34	—	—
(2) Physics laboratory, nuclear	742	—	—	—	—	146	23	20	553
(3) Physics laboratory, other	64	—	—	—	—	—	60	—	4
(4) Biological or medical laboratory	44	—	—	—	11	—	17	13	3
(5) General	262	16	—	—	—	—	242	1	3
2. Machinery, electrical and mechanical equipment	15,223	5,944	134	6,497	—	915	113	1,144	476
a. Electrical equipment	10,981	2,361	—	6,493	—	687	111	1,079	250
(1) Telephone, teletype, and related equipment	6,057	234	—	5,214	—	455	—	9	145
(2) Electric power plant equipment	1,709	629	—	517	—	203	—	354	6
(3) Electrical control and signaling equipment	1,441	138	—	640	—	11	2	648	2

Continued

Table 9. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

Technical occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
III. Electro and mechanical engineering technicians (continued)									
(4) Electrical equipment, parts, and components n.e.c.	1,499	1,198	—	10	—	18	109	67	97
(5) Combination: control, signaling, and other equipment n.e.c.	275	162	—	112	—	—	—	1	—
b. Nonelectrical machinery and other metal equipment	4,242	3,583	134	4	—	228	2	65	226
(1) Tool and die	1,833	1,740	—	—	—	54	1	28	10
(2) Manufacturing and mining machinery and equipment n.e.c.	1,089	1,070	—	—	—	10	—	7	2
(3) Chemical processing machinery and equipment	335	226	38	—	—	61	—	—	10
(4) Construction machinery and equipment	15	15	—	—	—	—	—	—	—
(5) Agricultural machinery and equipment	21	21	—	—	—	—	—	—	—
(6) Warehouse and other material moving machinery and equipment	56	44	—	—	—	—	—	—	12
(7) Heating, air conditioning, and related machinery and equipment	451	124	96	4	—	38	—	5	184
(8) General and other	442	343	—	—	—	65	1	25	8
3. Transportation equipment, aircraft, and ordnance	3,372	1,866	—	1,276	—	108	6	115	1
a. Aircraft and missile parts and equipment n.e.c.	2,784	1,421	—	1,264	—	90	—	8	1
(1) Aircraft electronic-electrical systems n.e.c.	996	508	—	467	—	21	—	—	—
(2) Jet engine	76	11	—	61	—	4	—	—	—
(3) Rocket engine	111	111	—	—	—	—	—	—	—
(4) Other aircraft engine	34	5	—	29	—	—	—	—	—
(5) Aircraft mechanical equipment and systems	233	194	—	17	—	20	—	1	1
(6) Missile equipment	280	267	—	—	—	13	—	—	—
(7) General	1,054	325	—	690	—	32	—	7	—
b. Transportation vehicles and equipment n.e.c.	508	411	—	12	—	18	6	61	—
(1) Ships and ship equipment	110	35	—	—	—	18	6	51	—
(2) Motor vehicles and equipment	285	275	—	—	—	—	—	10	—
(3) Railroad vehicles and equipment	113	101	—	12	—	—	—	—	—
c. Ordnance	80	34	—	—	—	—	—	46	—
4. Other products and equipment	346	87	—	—	—	150	6	3	100
a. Nonmetal cartons and containers	114	29	—	—	—	85	—	—	—
b. Other	232	58	—	—	—	65	6	3	100
C. Function	42,031	23,632	154	8,911	13	2,163	583	2,506	4,069
1. Design	7,689	6,073	2	273	—	919	33	122	267
2. Development	6,803	5,237	2	69	—	783	131	144	437
3. Installation	458	92	98	—	—	8	—	185	75
4. Troubleshooting and related functions	18,880	7,478	16	6,552	4	138	191	1,493	3,008
5. Combination of design and development	1,392	1,135	—	42	6	44	23	87	55
6. Combination of design and/or development and installing and/or troubleshooting	3,741	2,501	—	368	3	236	203	413	17
7. Combination of installing and troubleshooting	3,068	1,116	36	1,607	—	35	2	62	210
IV. Mathematics technicians	831	621	—	—	1	143	56	10	—

Continued

Table 9. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

Technical occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
V. Physical science technicians	8,969	6,756	5	125	10	547	650	560	316
A. Chemical and related	5,162	4,143	5	96	—	250	330	136	202
1. Pharmaceuticals	363	347	—	—	—	2	5	7	2
2. Fuels	338	335	—	2	—	1	—	—	—
3. Beverages and other food products	478	465	—	—	—	3	1	2	7
4. Industrial and other chemicals	3,983	2,996	5	94	—	244	324	127	193
B. Metallurgical and related	987	822	—	—	—	115	14	27	9
C. Physics-chemical	1,638	1,549	—	—	—	11	—	27	51
D. Physics, radiation, and nuclear	761	242	—	—	10	142	251	67	49
E. Meteorology	185	—	—	29	—	—	25	126	5
F. Minerals and soil	140	—	—	—	—	29	5	106	—
G. Other	96	—	—	—	—	—	25	71	—
VI. Biological, medical, dental, and related science technicians	25,445	488	—	12	16,454	75	2,199	5,389	828
A. Agricultural and related	340	37	—	—	—	—	166	128	9
B. Biological and medical laboratory	9,898	331	—	8	4,992	74	1,885	2,075	533
1. Bacteriology (microbiology)	727	150	—	—	412	9	47	100	9
2. Biochemistry	837	73	—	—	526	18	63	148	9
3. Tissue (histology)	428	3	—	—	305	4	22	87	7
4. Cytology	122	—	—	—	102	—	1	14	5
5. Hematology	617	—	—	—	477	4	31	104	1
6. Blood bank	380	—	—	—	345	—	—	34	1
7. Serology	106	—	—	—	73	—	—	33	—
8. General and other	6,681	105	—	8	2,752	39	1,721	1,555	501
C. General medical assistants, doctor's office (other than nurse or secretary)	1,114	2	—	—	1,111	—	—	—	1
D. X-ray and related equipment technicians	3,013	30	—	4	2,163	1	52	717	46
E. Other medical technicians	1,801	84	—	—	1,204	—	31	452	30
1. Electrocardiograph	548	2	—	—	451	—	7	85	3
2. Electroencephalograph	159	—	—	—	114	—	3	42	—
3. Inhalation therapy	153	—	—	—	74	—	—	59	20
4. Other	941	82	—	—	565	—	21	266	7
F. Therapists	1,883	2	—	—	744	—	29	932	176
1. Physical	1,003	2	—	—	543	—	15	381	62
2. Occupational, recreational, and other	880	—	—	—	201	—	14	551	114
G. Medical record librarians	347	—	—	—	265	—	—	76	6
H. Dental laboratory technicians	2,844	—	—	—	2,769	—	16	53	6
1. Ceramists	216	—	—	—	216	—	—	—	—
2. Dental mechanics	2,628	—	—	—	2,553	—	16	53	6
I. Dental hygienists	1,874	2	—	—	1,043	—	—	810	19
J. Dental assistants	2,331	—	—	—	2,163	—	20	146	2

Continued

Table 9. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

Technical occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
VII. Industrial engineering technicians and related specialists	6,901	5,230	—	120	—	247	19	1,145	140
A. Industrial engineering technicians	2,224	2,046	—	14	—	29	12	101	22
1. Time and motion study men and standards setters	1,104	1,083	—	—	—	6	—	9	6
2. Industrial process methods men	825	787	—	4	—	23	—	7	4
3. General	295	176	—	10	—	—	12	85	12
B. Quality control and reliability technicians	1,279	826	—	—	—	59	—	388	6
C. Production planners, estimators, and related specialists	2,918	2,268	—	59	—	140	7	429	15
1. Production planners	993	828	—	10	—	24	—	131	—
2. Production cost estimators	395	364	—	—	—	18	—	1	12
3. Production schedulers, coordinators, and expediters	515	427	—	23	—	1	7	56	1
4. Parts, equipment, and materials estimators, standardizers, coordinators, and catalogers	623	498	—	18	—	97	—	8	2
5. General	392	151	—	8	—	—	—	233	—
D. Equipment specialists	480	90	—	47	—	19	—	227	97
1. Electro equipment and systems	132	13	—	—	—	2	—	59	58
2. Industrial machinery, equipment, and tools	39	34	—	—	—	—	—	5	—
3. Ship and marine equipment	57	—	—	8	—	4	—	45	—
4. Aircraft, missiles, and automotive equipment	26	8	—	17	—	—	—	1	—
5. Ordnance	44	—	—	—	—	—	—	44	—
6. General and other	182	35	—	22	—	13	—	73	39
VIII. Civil engineering and construction technicians and specialists	13,464	130	5,765	664	—	2,106	16	4,633	150
A. Surveyors and related specialists	2,381	5	832	123	—	1,130	—	280	11
1. Surveyors	1,171	4	390	44	—	636	—	96	1
2. Instrumentmen	1,007	1	442	59	—	404	—	101	—
3. General and other	203	—	—	20	—	90	—	83	10
B. Civil engineering and construction technicians	4,932	23	2,135	262	—	251	11	2,239	11
1. Buildings	1,765	—	1,353	—	—	87	2	313	10
2. Highway, street, and other heavy construction	983	—	486	246	—	39	—	212	—
3. General and other	2,184	23	296	16	—	125	9	1,714	1
C. Construction inspectors	2,804	31	133	72	—	542	5	2,020	1
1. Building structures	1,126	1	2	—	—	174	—	948	1
2. Electrical and mechanical equipment	498	—	12	23	—	50	2	411	—
3. Plumbing	214	—	—	—	—	—	—	214	—
4. Heating, air conditioning, and related equipment	54	—	40	1	—	6	—	7	—
5. General and other	912	30	79	48	—	312	3	440	—

Continued

Table 9. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

Technical occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
VIII. Civil engineering and construction technicians and specialists (continued)									
D. Construction specification writers and cost estimators	3,347	71	2,665	207	—	183	—	94	127
1. Specification writers	117	—	—	19	—	47	—	51	—
a. Architectural and structural	72	—	—	—	—	46	—	26	—
b. Mechanical and electrical	25	—	—	—	—	1	—	24	—
c. Highway, street, and related construction	20	—	—	19	—	—	—	1	—
2. Cost estimators	2,898	71	2,525	27	—	111	—	37	127
a. Architectural and structural	1,426	43	1,287	—	—	49	—	32	15
b. Mechanical and electrical	841	3	792	—	—	—	—	—	46
c. Highway, street, and related construction	361	—	323	27	—	11	—	—	—
d. General	270	25	123	—	—	51	—	5	66
3. Combination: specification writers and cost estimators	332	—	140	161	—	25	—	6	—
a. Architectural and structural	92	—	80	2	—	10	—	—	—
b. Mechanical and electrical	161	—	—	159	—	—	—	2	—
c. Highway, street, and related construction	64	—	60	—	—	4	—	—	—
d. General and other	15	—	—	—	—	11	—	4	—
IX. Sales and service technicians	1,932	813	86	—	1	9	—	52	971
X. Technical writing and illustration specialists	3,034	2,205	—	35	—	615	11	78	90
A. Technical writers and related specialists	1,906	1,375	—	32	—	418	6	25	50
1. Technical writers and editors	1,669	1,306	—	32	—	273	6	13	39
2. Specifications writers, other than construction	237	69	—	—	—	145	—	12	11
B. Technical illustrators	1,082	814	—	3	—	187	3	35	40
C. General and other	46	16	—	—	—	10	2	18	—
XI. Safety and sanitation inspectors and related specialists	4,084	268	8	15	1	27	2	3,240	523
A. Industrial safety and fire prevention	2,253	138	8	13	1	6	—	1,574	513
B. Sanitation	1,771	130	—	2	—	21	2	1,606	10
C. Air Safety	60	—	—	—	—	—	—	60	—
XII. Product testing and inspection specialists	8,059	6,853	12	77	—	338	—	620	159
A. Instruments, meters, and related equipment	2,335	2,025	—	45	—	16	—	202	47
1. Testing, measuring, and control instruments	1,958	1,859	—	31	—	16	—	7	45
a. Electronic-electrical	1,659	1,606	—	31	—	12	—	—	10
b. General and other n.e.c.	299	253	—	—	—	4	—	7	35
2. Optical and photographic	145	143	—	—	—	—	—	—	2
3. Water, electric, and gas meters	64	23	—	14	—	—	—	27	—
4. Weights and measures	168	—	—	—	—	—	—	168	—

Continued

Table 9. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

Technical occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
XII. Product testing and inspection specialists (continued)									
B. Machinery, transportation and other metal equipment, and appliances n.e.c.	2,762	2,545	—	6	—	51	—	160	—
1. Industrial machinery and equipment	755	753	—	—	—	2	—	—	—
a. Electronic-electrical	362	362	—	—	—	—	—	—	—
b. General and other n.e.c.	393	391	—	—	—	2	—	—	—
2. Aircraft equipment	998	992	—	6	—	—	—	—	—
3. Automotive equipment	152	122	—	—	—	28	—	2	—
4. Office equipment	139	101	—	—	—	—	—	38	—
5. Household appliances	112	88	—	—	—	21	—	3	—
6. Military equipment	86	—	—	—	—	—	—	86	—
7. Metal castings, machined parts, and related materials	520	489	—	—	—	—	—	31	—
C. Chemical and other nonmetal products n.e.c.	1,926	1,556	12	11	—	116	—	143	88
1. Chemical and related products	846	745	—	11	—	36	—	43	11
a. Chemical and petroleum	377	344	—	—	—	26	—	—	7
b. Other	469	401	—	11	—	10	—	43	4
2. Construction materials	216	97	12	—	—	36	—	71	—
3. Paper and related products	315	304	—	—	—	—	—	11	—
a. Paper and pulp	239	239	—	—	—	—	—	—	—
b. Wood and other	76	65	—	—	—	—	—	11	—
4. Rubber and plastic products	166	166	—	—	—	—	—	—	—
5. Textiles and related products	314	192	—	—	—	44	—	1	77
a. Cloth	170	49	—	—	—	44	—	—	77
b. Other	144	143	—	—	—	—	—	1	—
6. Other	69	52	—	—	—	—	—	17	—
D. Food and agricultural products	563	443	—	—	—	31	—	75	14
1. Milk and milk products	307	265	—	—	—	31	—	1	10
2. General and other	256	178	—	—	—	—	—	74	4
E. Industrial X-ray and related processes	308	187	—	15	—	92	—	5	9
1. Industrial X-ray and radiography	223	123	—	15	—	83	—	2	—
2. General and other	85	64	—	—	—	9	—	3	9
F. General and other	165	97	—	—	—	32	—	35	1
XIII. Data-processing systems analysis and programming specialists	6,153	2,031	1	462	11	217	138	412	2,881
A. Systems analysts	1,875	484	—	76	2	26	9	125	1,153
B. Programmers	3,205	1,242	1	266	9	139	123	262	1,163
1. Business and accounting	2,301	753	1	266	7	38	18	97	1,121
2. Engineering and scientific	553	323	—	—	2	84	105	9	30
3. Combination: business and engineering	351	166	—	—	—	17	—	156	12
C. Combination: systems analysis and programming	936	271	—	120	—	29	—	18	498
D. Project planners	137	34	—	—	—	23	6	7	67

Continued

Table 9. NUMBER IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

Technical occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
XIV. Airway tower specialists and flight dispatchers	1,373	22	—	228	—	—	—	1,123	—
A. Airway tower specialists	1,145	22	—	—	—	—	—	1,123	—
B. Flight dispatchers	228	—	—	228	—	—	—	—	—
XV. Broadcasting, motion picture, and recording studio specialists	2,920	184	—	2,297	—	—	8	97	334
A. Studio technicians	1,521	139	—	1,051	—	—	7	25	299
1. Technical directors	96	—	—	95	—	—	1	—	—
2. Light	87	—	—	40	—	—	—	3	44
3. Audio and acoustics	194	5	—	115	—	—	1	—	73
4. Sound effects	61	—	—	28	—	—	—	—	33
5. Video control	36	—	—	36	—	—	—	—	—
6. Recording	234	113	—	12	—	—	3	13	93
7. Studio field	713	21	—	647	—	—	2	—	43
8. General	100	—	—	78	—	—	—	9	13
B. Video tape and kinescope technicians	194	—	—	174	—	—	—	—	20
C. Equipment and maintenance technicians	1,205	45	—	1,072	—	—	1	72	15
1. Transmitter	431	28	—	328	—	—	—	63	12
2. Transmission	111	—	—	109	—	—	—	—	2
3. Maintenance	315	17	—	288	—	—	—	9	1
4. General	348	—	—	347	—	—	1	—	—

[a] Includes architectural as well as engineering service enterprises; research, development, and testing laboratories; and business and management consulting services.

Table 10. NUMBER IN EACH TECHNICAL OCCUPATION GROUP, BY AREA AND INDUSTRY DIVISION

Technical occupation group	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Rochester	Syracuse	Utica	All other
All industries											
All technical occupations	148,684	62,739	22,835	5,749	7,241	3,886	12,968	8,163	5,490	2,890	16,723
Draftsmen	20,972	10,432	2,459	817	774	528	1,978	978	795	236	1,975
Structural design technicians and related specialists	2,516	1,748	528	47	45	5	55	5	50	—	33
Electro and mechanical engineering technicians	42,031	13,894	10,082	1,312	2,010	1,763	3,149	2,315	1,758	1,171	4,577
Mathematics technicians	831	156	466	12	79	6	47	16	25	—	24
Physical science technicians	8,969	1,937	393	457	761	268	1,798	1,333	323	87	1,612
Biological, medical, dental, and related science technicians	25,445	14,107	1,905	1,023	1,075	278	1,853	1,209	837	315	2,843
Industrial engineering technicians and related specialists	6,901	1,685	1,218	134	602	251	726	504	300	259	1,222
Civil engineering and construction technicians and specialists	13,464	5,590	1,411	912	760	371	1,423	543	462	225	1,767
Sales and service technicians	1,932	1,101	281	58	17	30	124	103	32	3	183
Technical writing and illustration specialists	3,034	1,588	797	20	55	64	151	70	108	78	103
Safety and sanitation inspectors and related specialists	4,084	2,367	200	60	199	61	287	129	100	93	588
Product testing and inspection specialists	8,059	1,667	2,255	570	462	99	808	537	355	125	1,181
Data-processing systems analysis and programming specialists	6,153	3,673	297	278	263	120	323	321	250	206	422
Airway tower specialists and flight dispatchers	1,373	536	516	25	34	19	74	31	18	55	65
Broadcasting, motion picture, and recording studio specialists	2,920	2,258	27	24	105	23	172	69	77	37	128
Manufacturing											
All technical occupations	59,085	10,267	15,279	2,519	2,643	2,493	7,025	5,365	2,964	1,470	9,060
Draftsmen	9,357	2,642	1,546	365	291	208	1,322	792	596	192	1,403
Structural design technicians and related specialists	495	14	428	20	—	—	8	—	—	—	25
Electro and mechanical engineering technicians	23,632	3,037	8,125	764	924	1,502	2,157	1,868	1,213	702	3,340
Mathematics technicians	621	18	466	12	35	6	37	16	25	—	6
Physical science technicians	6,756	780	281	444	376	259	1,731	1,228	296	68	1,293
Biological, medical, dental, and related science technicians	488	18	6	39	150	1	36	31	43	2	162
Industrial engineering technicians and related specialists	5,230	534	1,125	134	457	251	631	504	211	237	1,146
Civil engineering and construction technicians and specialists	130	55	18	2	12	—	21	15	1	—	6
Sales and service technicians	813	192	166	58	15	13	60	103	30	3	173
Technical writing and illustration specialists	2,205	1,029	709	20	19	40	87	70	84	55	92
Safety and sanitation inspectors and related specialists	268	18	10	14	14	7	30	18	7	2	148
Product testing and inspection specialists	6,853	1,083	2,190	545	276	95	732	493	329	113	997
Data-processing systems analysis and programming specialists	2,031	666	187	102	74	111	173	226	129	96	267
Airway tower specialists and flight dispatchers	22	—	22	—	—	—	—	—	—	—	—
Broadcasting, motion picture, and recording studio specialists	184	181	—	—	—	—	—	1	—	—	2
Construction											
All technical occupations	7,523	4,045	330	740	156	186	817	275	170	—	804
Draftsmen	1,163	795	5	123	9	—	67	—	—	—	164
Structural design technicians and related specialists	329	329	—	—	—	—	—	—	—	—	—
Electro and mechanical engineering technicians	154	154	—	—	—	—	—	—	—	—	—
Mathematics technicians	—	—	—	—	—	—	—	—	—	—	—
Physical science technicians	5	5	—	—	—	—	—	—	—	—	—
Biological, medical, dental, and related science technicians	—	—	—	—	—	—	—	—	—	—	—

Continued

Table 10. NUMBER IN EACH TECHNICAL OCCUPATION GROUP, BY AREA AND INDUSTRY DIVISION

Technical occupation group	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Rochester	Syracuse	Utica	All other
Construction (continued)											
Industrial engineering technicians and related specialists	—	—	—	—	—	—	—	—	—	—	—
Civil engineering and construction technicians and specialists	5,765	2,701	324	617	137	169	747	271	168	—	631
Sales and service technicians	86	56	—	—	—	17	2	—	2	—	9
Technical writing and illustration specialists	—	—	—	—	—	—	—	—	—	—	—
Safety and sanitation inspectors and related specialists	8	4	1	—	—	—	1	2	—	—	—
Product testing and inspection specialists	12	—	—	—	10	—	—	2	—	—	—
Data-processing systems analysis and programming specialists	1	1	—	—	—	—	—	—	—	—	—
Airway tower specialists and flight dispatchers	—	—	—	—	—	—	—	—	—	—	—
Broadcasting, motion picture, and recording studio specialists	—	—	—	—	—	—	—	—	—	—	—
Transportation, communication, and public utilities											
All technical occupations	14,084	9,560	720	578	426	97	893	340	463	215	792
Draftsmen	1,055	737	62	38	27	16	86	31	31	—	27
Structural design technicians and related specialists	83	39	4	—	5	—	25	—	8	—	2
Electro and mechanical engineering technicians	8,911	5,974	606	403	231	53	501	220	246	133	544
Mathematics technicians	—	—	—	—	—	—	—	—	—	—	—
Physical science technicians	125	117	2	—	—	—	—	2	4	—	—
Biological, medical, dental, and related science technicians	12	12	—	—	—	—	—	—	—	—	—
Industrial engineering technicians and related specialists	120	108	—	—	8	—	—	—	4	—	—
Civil engineering and construction technicians and specialists	664	304	15	4	44	3	87	15	83	24	85
Sales and service technicians	—	—	—	—	—	—	—	—	—	—	—
Technical writing and illustration specialists	35	35	—	—	—	—	—	—	—	—	—
Safety and sanitation inspectors and related specialists	15	7	2	—	1	—	2	2	—	—	1
Product testing and inspection specialists	77	50	2	—	3	2	3	—	5	4	8
Data-processing systems analysis and programming specialists	462	301	—	120	2	—	17	2	5	8	7
Airway tower specialists and flight dispatchers	228	219	—	—	—	—	—	—	—	9	—
Broadcasting, motion picture, and recording studio specialists	2,297	1,657	27	13	105	23	172	68	77	37	118
Private medical services											
All technical occupations	16,496	9,153	1,480	796	629	179	1,199	708	483	231	1,638
Draftsmen	5	5	—	—	—	—	—	—	—	—	—
Structural design technicians and related specialists	—	—	—	—	—	—	—	—	—	—	—
Electro and mechanical engineering technicians	13	3	—	—	—	—	6	4	—	—	—
Mathematics technicians	1	1	—	—	—	—	—	—	—	—	—
Physical science technicians	10	10	—	—	—	—	—	—	—	—	—
Biological, medical, dental, and related science technicians	16,454	9,122	1,480	796	629	179	1,192	704	483	231	1,638
Industrial engineering technicians and related specialists	—	—	—	—	—	—	—	—	—	—	—
Civil engineering and construction technicians and specialists	—	—	—	—	—	—	—	—	—	—	—
Sales and service technicians	1	—	—	—	—	—	1	—	—	—	—
Technical writing and illustration specialists	—	—	—	—	—	—	—	—	—	—	—
Safety and sanitation inspectors and related specialists	1	1	—	—	—	—	—	—	—	—	—
Product testing and inspection specialists	—	—	—	—	—	—	—	—	—	—	—
Data-processing systems analysis and programming specialists	11	11	—	—	—	—	—	—	—	—	—
Airway tower specialists and flight dispatchers	—	—	—	—	—	—	—	—	—	—	—
Broadcasting, motion picture, and recording studio specialists	—	—	—	—	—	—	—	—	—	—	—

Continued

Table 10. NUMBER IN EACH TECHNICAL OCCUPATION GROUP, BY AREA AND INDUSTRY DIVISION

Technical occupation group	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Rochester	Syracuse	Utica	All other
Research, development, and testing laboratories; engineering and architectural services; business and management consulting services											
All technical occupations	14,749	9,160	1,403	461	1,061	345	865	238	287	95	834
Draftsmen	6,923	4,841	584	210	137	191	356	131	157	35	281
Structural design technicians and related specialists	1,339	1,140	89	27	3	5	22	5	42	—	6
Electro and mechanical engineering technicians	2,163	1,211	312	22	363	74	131	10	3	—	37
Mathematics technicians	143	75	—	—	40	—	10	—	—	—	18
Physical science technicians	547	134	2	13	303	—	28	—	1	—	66
Biological, medical, dental, and related science technicians	75	68	—	—	—	—	—	—	—	—	7
Industrial engineering technicians and related specialists	247	125	7	—	106	—	1	—	—	—	8
Civil engineering and construction technicians and specialists	2,106	713	373	169	52	51	217	91	52	55	333
Sales and service technicians	9	6	—	—	2	—	1	—	—	—	—
Technical writing and illustration specialists	615	470	7	—	21	24	64	—	24	5	—
Safety and sanitation inspectors and related specialists	27	—	—	—	—	—	4	—	2	—	21
Product testing and inspection specialists	338	220	24	17	—	—	13	1	6	—	57
Data-processing systems analysis and programming specialists	217	157	5	3	34	—	18	—	—	—	—
Airway tower specialists and flight dispatchers	—	—	—	—	—	—	—	—	—	—	—
Broadcasting, motion picture, and recording studio specialists	—	—	—	—	—	—	—	—	—	—	—
Private colleges and schools											
All technical occupations	3,754	2,721	12	3	102	—	2	462	42	—	410
Draftsmen	67	47	1	—	3	—	—	3	—	—	13
Structural design technicians and related specialists	5	5	—	—	—	—	—	—	—	—	—
Electro and mechanical engineering technicians	583	417	10	—	35	—	—	36	35	—	50
Mathematics technicians	56	56	—	—	—	—	—	—	—	—	—
Physical science technicians	650	440	1	—	11	—	1	97	—	—	100
Biological, medical, dental, and related science technicians	2,199	1,644	—	—	47	—	—	319	4	—	185
Industrial engineering technicians and related specialists	19	19	—	—	—	—	—	—	—	—	—
Civil engineering and construction technicians and specialists	16	13	—	3	—	—	—	—	—	—	—
Sales and service technicians	—	—	—	—	—	—	—	—	—	—	—
Technical writing and illustration specialists	11	8	—	—	—	—	—	—	—	—	3
Safety and sanitation inspectors and related specialists	2	2	—	—	—	—	—	—	—	—	—
Product testing and inspection specialists	—	—	—	—	—	—	—	—	—	—	—
Data-processing systems analysis and programming specialists	138	63	—	—	6	—	1	7	3	—	58
Airway tower specialists and flight dispatchers	—	—	—	—	—	—	—	—	—	—	—
Broadcasting, motion picture, and recording studio specialists	8	7	—	—	—	—	—	—	—	—	1
Government											
All technical occupations	21,063	10,790	2,166	381	1,736	347	1,507	470	694	741	2,231
Draftsmen	1,072	567	103	19	283	5	42	16	4	9	24
Structural design technicians and related specialists	126	119	7	—	—	—	—	—	—	—	—
Electro and mechanical engineering technicians	2,506	1,835	128	12	107	22	55	12	16	232	87
Mathematics technicians	10	6	—	—	4	—	—	—	—	—	—
Physical science technicians	560	315	25	—	71	9	38	6	20	18	58
Biological, medical, dental, and related science technicians	5,389	2,571	398	152	249	98	575	107	306	82	851

Continued

Table 10. NUMBER IN EACH TECHNICAL OCCUPATION GROUP, BY AREA AND INDUSTRY DIVISION

Technical occupation group	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Rochester	Syracuse	Utica	All other
Government (continued)											
Industrial engineering technicians and related specialists	1,145	797	84	—	31	—	80	—	67	22	64
Civil engineering and construction technicians and specialists	4,633	1,733	681	117	515	138	351	151	157	146	644
Sales and service technicians	52	52	—	—	—	—	—	—	—	—	—
Technical writing and illustration specialists	78	31	15	—	14	—	—	—	—	18	—
Safety and sanitation inspectors and related specialists	3,240	1,912	187	46	184	54	244	107	91	76	339
Product testing and inspection specialists	620	214	39	8	173	2	32	39	15	8	90
Data-processing systems analysis and programming specialists	412	213	5	2	71	—	16	1	—	84	2
Airway tower specialists and flight dispatchers	1,123	317	494	25	34	19	74	31	18	46	65
Broadcasting, motion picture, and recording studio specialists	97	90	—	—	—	—	—	—	—	—	7
All other industries											
All technical occupations	11,930	7,043	1,445	271	488	239	660	305	387	138	954
Draftsmen	1,330	798	158	62	24	108	105	5	7	—	63
Structural design technicians and related specialists	139	102	—	—	37	—	—	—	—	—	—
Electro and mechanical engineering technicians	4,069	1,263	901	111	350	112	299	165	245	104	519
Mathematics technicians	—	—	—	—	—	—	—	—	—	—	—
Physical science technicians	316	136	82	—	—	—	—	—	2	1	95
Biological, medical, dental, and related science technicians	828	672	21	36	—	—	50	48	1	—	—
Industrial engineering technicians and related specialists	140	102	2	—	—	—	14	—	18	—	4
Civil engineering and construction technicians and specialists	150	71	—	—	—	10	—	—	1	—	68
Sales and service technicians	971	795	115	—	—	—	60	—	—	—	1
Technical writing and illustration specialists	90	15	66	—	1	—	—	—	—	—	8
Safety and sanitation inspectors and related specialists	523	423	—	—	—	—	6	—	—	15	79
Product testing and inspection specialists	159	100	—	—	—	—	28	2	—	—	29
Data-processing systems analysis and programming specialists	2,881	2,243	100	51	76	9	98	85	113	18	88
Airway tower specialists and flight dispatchers	—	—	—	—	—	—	—	—	—	—	—
Broadcasting, motion picture, and recording studio specialists	334	323	—	11	—	—	—	—	—	--	--

Table 11. FUNCTION IN RELATION TO FIELD AMONG ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS, BY AREA AND INDUSTRY DIVISION

(Number in technical occupations)

Field by function	New York State	New York City	Nassau-Suffolk	Westchester	Albany	Binghamton	Buffalo	Rochester	Syracuse	Utica	All other
All industries											
All fields	42,031	13,894	10,082	1,312	2,010	1,763	3,149	2,315	1,758	1,171	4,577
Design	7,689	1,761	1,776	129	749	347	691	588	389	154	1,105
Development	11,936	2,903	3,451	373	421	521	976	1,036	471	290	1,494
Troubleshooting	22,406	9,230	4,855	810	840	895	1,482	691	898	727	1,978
Electronic	10,791	2,912	3,815	314	280	450	503	75	508	701	1,233
Design	489	100	40	1	35	64	—	—	55	18	176
Development	4,873	1,120	1,751	121	158	251	340	18	142	195	777
Troubleshooting	5,429	1,692	2,024	192	87	135	163	57	311	488	280
Electrical	8,794	3,985	1,249	304	390	199	883	580	386	111	707
Design	1,006	273	253	11	151	19	165	23	24	4	83
Development	2,497	957	293	40	69	107	161	451	89	7	323
Troubleshooting	5,291	2,755	703	253	170	73	557	106	273	100	301
Mechanical	8,461	2,260	1,680	155	603	346	917	875	257	113	1,255
Design	4,450	1,064	804	84	407	189	469	502	119	63	749
Development	2,092	488	326	37	104	85	279	298	109	30	336
Troubleshooting	1,919	708	550	34	92	72	169	75	29	20	170
Electro-mechanical	13,985	4,737	3,338	539	737	768	846	785	607	246	1,382
Design	1,744	324	679	33	156	75	57	63	191	69	97
Development	2,474	338	1,081	175	90	78	196	269	131	58	58
Troubleshooting	9,767	4,075	1,578	331	491	615	593	453	285	119	1,227
Manufacturing											
All fields	23,632	3,037	8,125	764	924	1,502	2,157	1,868	1,213	702	3,340
Design	6,073	856	1,551	124	484	254	634	574	368	154	1,074
Development	8,873	1,185	2,863	356	205	488	844	975	396	171	1,390
Troubleshooting	8,686	996	3,711	284	235	760	679	319	449	377	876
Electronic	7,840	1,309	3,267	290	187	411	386	51	436	422	1,081
Design	393	35	18	—	27	64	—	—	55	18	176
Development	3,734	648	1,422	108	96	228	272	8	125	77	750
Troubleshooting	3,713	626	1,827	182	64	119	114	43	256	327	155
Electrical	3,546	357	971	88	262	151	562	443	218	38	456
Design	701	66	236	11	142	4	135	15	14	4	74
Development	1,564	167	272	36	60	98	142	421	69	6	293
Troubleshooting	1,281	124	463	41	60	49	285	7	135	28	89
Mechanical	6,503	988	1,406	151	441	301	843	856	199	113	1,205
Design	3,743	593	754	80	310	147	443	496	108	63	749
Development	1,510	209	198	37	47	84	256	286	71	30	292
Troubleshooting	1,250	186	454	34	84	70	144	74	20	20	164
Electro-mechanical	5,743	383	2,481	235	34	639	366	518	360	129	598
Design	1,236	162	543	33	5	39	56	63	191	69	75
Development	2,065	161	971	175	2	78	174	260	131	58	55
Troubleshooting	2,442	60	967	27	27	522	136	195	38	2	468

Continued

Table 11. FUNCTION IN RELATION TO FIELD AMONG ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS, BY AREA AND INDUSTRY DIVISION

(Number in technical occupations)

Field by function	New York State	New York City	Nassau-Suffolk	Westchester	Albany	Binghamton	Buffalo	Rochester	Syracuse	Utica	All other
Construction											
All fields	154	154	—	—	—	—	—	—	—	—	—
Design	2	2	—	—	—	—	—	—	—	—	—
Development	2	2	—	—	—	—	—	—	—	—	—
Troubleshooting	150	150	—	—	—	—	—	—	—	—	—
Electronic	2	2	—	—	—	—	—	—	—	—	—
Development	2	2	—	—	—	—	—	—	—	—	—
Electrical	—	—	—	—	—	—	—	—	—	—	—
Mechanical	152	152	—	—	—	—	—	—	—	—	—
Design	2	2	—	—	—	—	—	—	—	—	—
Troubleshooting	150	150	—	—	—	—	—	—	—	—	—
Electro-mechanical	—	—	—	—	—	—	—	—	—	—	—
Transportation, communication, and public utilities											
All fields	8,911	5,974	606	403	231	53	501	220	246	133	544
Design	273	160	15	—	12	—	51	8	19	—	8
Development	479	367	7	—	2	12	14	30	12	1	34
Troubleshooting	8,159	5,447	584	403	217	41	436	182	215	132	502
Electronic	390	366	2	—	7	3	5	—	—	—	7
Development	44	41	—	—	—	3	—	—	—	—	—
Troubleshooting	346	325	2	—	7	—	5	—	—	—	7
Electrical	3,594	2,132	221	212	117	30	288	135	146	73	240
Design	152	84	9	—	7	—	26	8	10	—	8
Development	272	177	2	—	2	9	14	30	12	1	25
Troubleshooting	3,170	1,871	210	212	108	21	248	97	124	72	207
Mechanical	380	315	6	—	6	—	25	1	18	—	9
Design	121	76	6	—	5	—	25	—	9	—	—
Development	66	57	—	—	—	—	—	—	—	—	9
Troubleshooting	193	182	—	—	1	—	—	1	9	—	—
Electro-mechanical	4,547	3,161	377	191	101	20	183	84	82	60	288
Development	97	92	5	—	—	—	—	—	—	—	—
Troubleshooting	4,450	3,069	372	191	101	20	183	84	82	60	288
Private medical services											
All fields	13	3	—	—	—	—	6	4	—	—	—
Development	9	—	—	—	—	—	6	3	—	—	—
Troubleshooting	4	3	—	—	—	—	—	1	—	—	—
Electronic	3	3	—	—	—	—	—	—	—	—	—
Troubleshooting	3	3	—	—	—	—	—	—	—	—	—
Electrical	—	—	—	—	—	—	—	—	—	—	—
Mechanical	9	—	—	—	—	—	6	3	—	—	—
Development	9	—	—	—	—	—	6	3	—	—	—
Electro-mechanical	1	—	—	—	—	—	—	1	—	—	—
Troubleshooting	1	—	—	—	—	—	—	1	—	—	—

Continued

Table 11. FUNCTION IN RELATION TO FIELD AMONG ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS, BY AREA AND INDUSTRY DIVISION

(Number in technical occupations)

Field by function	New York State	New York City	Nassau-Suffolk	Westchester	Albany	Binghamton	Buffalo	Rochester	Syracuse	Utica	All other
Research, development, and testing laboratories; engineering and architectural services; business and management consulting services											
All fields	2,163	1,211	312	22	363	74	131	10	3	—	37
Design	919	615	74	5	155	53	2	—	1	—	14
Development	1,063	511	183	17	191	21	105	10	2	—	23
Troubleshooting	181	85	55	—	17	—	24	—	—	—	—
Electronic	704	353	159	14	63	20	81	10	—	—	4
Design	93	62	22	1	8	—	—	—	—	—	—
Development	560	268	123	13	55	20	67	10	—	—	4
Troubleshooting	51	23	14	—	—	—	14	—	—	—	—
Electrical	341	266	49	4	7	3	8	—	—	—	4
Design	108	105	—	—	—	3	—	—	—	—	—
Development	177	141	19	4	7	—	2	—	—	—	4
Troubleshooting	56	20	30	—	—	—	6	—	—	—	—
Mechanical	558	396	45	4	43	33	19	—	3	—	15
Design	372	318	15	4	1	32	1	—	1	—	—
Development	171	68	28	—	42	1	15	—	2	—	15
Troubleshooting	15	10	2	—	—	—	3	—	—	—	—
Electro-mechanical	560	196	59	—	250	18	23	—	—	—	14
Design	346	130	37	—	146	18	1	—	—	—	14
Development	155	34	13	—	87	—	21	—	—	—	—
Troubleshooting	59	32	9	—	17	—	1	—	—	—	—
Private colleges and schools											
All fields	583	417	10	—	35	—	—	36	35	—	50
Design	33	11	10	—	5	—	—	6	1	—	—
Development	357	259	—	—	21	—	—	18	34	—	25
Troubleshooting	193	147	—	—	9	—	—	12	—	—	25
Electronic	148	115	—	—	7	—	—	—	1	—	25
Development	50	41	—	—	6	—	—	—	1	—	2
Troubleshooting	98	74	—	—	1	—	—	—	—	—	23
Electrical	123	119	—	—	3	—	—	—	—	—	1
Design	2	—	—	—	2	—	—	—	—	—	—
Development	93	92	—	—	—	—	—	—	—	—	1
Troubleshooting	28	27	—	—	1	—	—	—	—	—	—
Mechanical	272	169	10	—	25	—	—	15	34	—	19
Design	31	11	10	—	3	—	—	6	1	—	—
Development	188	112	—	—	15	—	—	9	33	—	19
Troubleshooting	53	46	—	—	7	—	—	—	—	—	—
Electro-mechanical	40	14	—	—	—	—	—	21	—	—	5
Development	26	14	—	—	—	—	—	9	—	—	3
Troubleshooting	14	—	—	—	—	—	—	12	—	—	2

Continued

Table 11. FUNCTION IN RELATION TO FIELD AMONG ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS, BY AREA AND INDUSTRY DIVISION

(Number in technical occupations)

Field by function	New York State	New York City	Nassau-Suffolk	Westchester	Albany	Binghamton	Buffalo	Rochester	Syracuse	Utica	All other
Government											
All fields	2,506	1,835	128	12	107	22	55	12	16	232	87
Design	122	18	12	—	88	—	3	—	—	—	1
Development	644	508	9	—	2	—	6	—	—	112	7
Troubleshooting	1,740	1,309	107	12	17	22	46	12	16	120	79
Electronic	1,049	546	107	10	16	16	31	11	13	231	68
Development	234	105	9	—	1	—	1	—	—	112	6
Troubleshooting	815	441	98	10	15	16	30	11	13	119	62
Electrical	1,052	1,030	—	—	—	3	14	—	—	—	5
Design	4	—	—	—	—	—	3	—	—	—	1
Development	356	354	—	—	—	—	2	—	—	—	—
Troubleshooting	692	676	—	—	—	3	9	—	—	—	4
Mechanical	217	110	4	—	88	2	6	—	—	—	7
Design	105	16	1	—	88	—	—	—	—	—	—
Development	33	30	—	—	—	—	2	—	—	—	1
Troubleshooting	79	64	3	—	—	2	4	—	—	—	6
Electro-mechanical	188	149	17	2	3	1	4	1	3	1	7
Design	13	2	11	—	—	—	—	—	—	—	—
Development	21	19	—	—	1	—	1	—	—	—	—
Troubleshooting	154	128	6	2	2	1	3	1	3	1	7
All other industries											
All fields	4,069	1,263	901	111	350	112	299	165	245	104	519
Design	267	99	114	—	5	40	1	—	—	—	8
Development	509	71	389	—	—	—	1	—	27	6	15
Troubleshooting	3,293	1,093	398	111	345	72	297	165	218	98	496
Electronic	655	218	280	—	—	—	—	3	58	48	48
Design	3	3	—	—	—	—	—	—	—	—	—
Development	249	15	197	—	—	—	—	—	16	6	15
Troubleshooting	403	200	83	—	—	—	—	3	42	42	33
Electrical	138	81	8	—	1	12	11	2	22	—	1
Design	39	18	8	—	—	12	1	—	—	—	—
Development	35	26	—	—	—	—	1	—	8	—	—
Troubleshooting	64	37	—	—	1	—	9	2	14	—	1
Mechanical	370	130	209	—	—	10	18	—	3	—	—
Design	76	48	18	—	—	10	—	—	—	—	—
Development	115	12	100	—	—	—	—	—	3	—	—
Troubleshooting	179	70	91	—	—	—	18	—	—	—	—
Electro-mechanical	2,906	834	404	111	349	90	270	160	162	56	470
Design	149	30	88	—	5	18	—	—	—	—	8
Development	110	18	92	—	—	—	—	—	—	—	—
Troubleshooting	2,647	786	224	111	344	72	270	160	162	56	462

Table 12. PRODUCT OR EQUIPMENT WORKED ON BY ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS WHOSE FUNCTION IS (A) DESIGN, (B) DEVELOPMENT, AND (C) TROUBLESHOOTING, BY AREA[a]

(Number in technical occupations)

Product or equipment worked on	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Rochester	Syracuse	Utica	All other
Design											
All products or equipment worked on	7,689	1,761	1,776	129	749	347	691	588	389	154	1,105
1. Instruments and electronic and science laboratory equipment	2,729	317	978	31	164	235	77	291	139	69	428
a. Electronic equipment and instruments	1,589	158	588	28	29	132	41	100	138	69	306
(1) Communications equipment	193	72	71	2	—	—	—	—	45	3	—
(a) Radio, television, audio	37	21	6	—	—	—	—	—	7	3	—
(b) Radar, sonar, microwave	58	18	38	2	—	—	—	—	—	—	—
(c) Other and combinations	98	33	27	—	—	—	—	—	38	—	—
(2) Digital computers	454	—	30	—	—	132	—	—	—	5	287
(3) Testing, measuring, and control instruments	66	14	44	—	—	—	1	—	2	4	1
(4) Electronic components	162	33	33	1	10	—	40	—	17	15	13
(5) General and other	714	39	410	25	19	—	—	100	74	42	5
b. Electronic-mechanical instruments	604	108	246	1	18	71	13	33	—	—	114
(1) Industrial servo-control instruments, fire control, guidance, and other analog applications	356	76	130	—	—	35	13	—	—	—	102
(2) Testing, measuring, and control instruments, other than servo	66	9	23	1	—	—	—	33	—	—	—
(3) General and other	182	23	93	—	18	36	—	—	—	—	12
c. Mechanical instruments	372	40	91	2	27	32	19	152	1	—	8
(1) Testing, measuring, and control instruments	165	24	89	—	27	—	19	1	—	—	5
(a) General	77	—	48	—	27	—	—	1	—	—	1
(b) Hydraulic, pneumatic, and other	88	24	41	—	—	—	19	—	—	—	4
(2) Optical and photographic instruments	166	8	—	1	—	4	—	150	—	—	3
(3) General and other	41	8	2	1	—	28	—	1	1	—	—
d. Science laboratory equipment n.e.c.	164	11	53	—	90	—	4	6	—	—	—
(1) Chemical laboratory[b]	—	—	—	—	—	—	—	—	—	—	—
(2) Physics laboratory, nuclear[b]	133	—	—	—	—	—	—	—	—	—	—
(3) Physics laboratory, other[b]	12	—	—	—	—	—	—	—	—	—	—
(4) Biological or medical laboratory[b]	4	—	—	—	—	—	—	—	—	—	—
(5) General[b]	15	—	—	—	—	—	—	—	—	—	—
2. Machinery, electrical and mechanical equipment	4,173	1,235	559	97	488	100	548	245	202	76	623
a. Electrical equipment	1,411	514	28	19	416	3	277	23	38	—	93
(1) Telephone, teletype, and related equipment	102	94	—	—	—	—	—	8	—	—	—
(2) Electric power plant equipment	909	306	15	—	305	—	256	—	19	—	8
(3) Electrical control and signaling equipment	23	10	2	—	—	—	—	6	5	—	—
(4) Electrical equipment, parts, and components n.e.c.	362	100	11	19	111	3	21	3	10	—	84
(5) Combination: control, signaling, and other equipment n.e.c.	15	4	—	—	—	—	—	6	4	—	1

Continued

Table 12. PRODUCT OR EQUIPMENT WORKED ON BY ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS WHOSE FUNCTION IS (A) DESIGN, (B) DEVELOPMENT, AND (C) TROUBLESHOOTING, BY AREA[a]

(Number in technical occupations)

Product or equipment worked on	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Rochester	Syracuse	Utica	All other
Design (continued)											
b. Nonelectrical machinery and other metal equipment	2,762	721	531	78	72	97	271	222	164	76	530
(1) Tool and die	1,670	351	331	56	47	94	201	143	85	33	329
(2) Manufacturing and mining machinery and equipment n.e.c.	592	88	171	7	17	—	32	47	77	33	120
(3) Chemical processing machinery and equipment	121	61	10	—	8	—	30	8	—	—	4
(4) Construction machinery and equipment	—	—	—	—	—	—	—	—	—	—	—
(5) Agricultural machinery and equipment	15	—	—	—	—	—	—	—	—	—	15
(6) Warehouse equipment and other material moving machinery	46	15	3	—	—	—	—	—	—	—	28
(7) Heating, air conditioning, and related machinery and equipment	60	50	1	—	—	—	5	—	—	—	4
(8) General and other	258	156	15	15	—	3	3	24	2	10	30
3. Transportation equipment, aircraft, and ordnance	517	39	186	1	69	—	64	52	48	9	49
a. Aircraft and missile parts and equipment n.e.c.	273	—	184	1	8	—	16	—	48	4	12
(1) Aircraft electronic-electrical systems n.e.c.[b]	102	—	—	—	—	—	—	—	—	—	—
(2) Jet engine[b]	6	—	—	—	—	—	—	—	—	—	—
(3) Rocket engine[b]	1	—	—	—	—	—	—	—	—	—	—
(4) Other aircraft engine[b]	—	—	—	—	—	—	—	—	—	—	—
(5) Aircraft mechanical equipment and systems[b]	106	—	—	—	—	—	—	—	—	—	—
(6) Missile equipment[b]	49	—	—	—	—	—	—	—	—	—	—
(7) General[b]	9	—	—	—	—	—	—	—	—	—	—
b. Transportation vehicles and equipment n.e.c.	187	23	—	—	31	—	48	52	—	—	33
(1) Ships and ship equipment	16	16	—	—	—	—	—	—	—	—	—
(2) Motor vehicles and equipment	112	—	—	—	—	—	46	52	—	—	14
(3) Railroad vehicles and equipment	59	7	—	—	31	—	2	—	—	—	19
c. Ordnance	57	16	2	—	30	—	—	—	—	5	4
4. Other products and equipment	270	170	53	—	28	12	2	—	—	—	5
a. Nonmetal cartons and containers	93	86	—	—	—	—	2	—	—	—	5
b. Other	177	84	53	—	28	12	—	—	—	—	—
Development											
All products or equipment worked on	11,936	2,903	3,451	373	421	521	976	1,036	471	290	1,494
1. Instruments and electronic and science laboratory equipment	8,083	1,221	2,922	266	301	507	546	631	334	261	1,094
a. Electronic equipment and instruments	4,929	857	1,569	230	135	319	372	172	282	244	749
(1) Communications equipment	1,720	568	698	39	—	7	42	52	115	142	57
(a) Radio, television, audio	675	161	390	15	—	—	—	—	27	25	57
(b) Radar, sonar, microwave	450	93	222	—	—	—	29	—	48	58	—
(c) Other and combinations	595	314	86	24	—	7	13	52	40	59	—

Continued

Table 12. PRODUCT OR EQUIPMENT WORKED ON BY ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS WHOSE FUNCTION IS (A) DESIGN, (B) DEVELOPMENT, AND (C) TROUBLESHOOTING, BY AREA[a]

(Number in technical occupations)

Product or equipment worked on	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Rochester	Syracuse	Utica	All other
Development (continued)											
(2) Digital computers	818	2	77	5	—	253	17	10	—	—	454
(3) Testing, measuring, and control instruments	585	119	187	37	14	53	56	1	33	36	49
(4) Electronic components	800	77	320	31	88	3	6	—	79	29	167
(5) General and other	1,006	91	287	118	33	3	251	109	55	37	22
b. Electronic-mechanical instruments	1,871	155	952	33	79	187	93	55	9	17	291
(1) Industrial servo-control instruments, fire control, guidance, and other analog applications	1,290	74	667	1	28	158	70	—	—	3	289
(2) Testing, measuring, and control instruments, other than servo	281	45	26	32	46	29	23	55	9	14	2
(3) General and other	300	36	259	—	5	—	—	—	—	—	—
c. Mechanical instruments	595	79	29	3	11	1	68	368	7	—	29
(1) Testing, measuring, and control instruments	159	49	23	1	11	—	62	—	3	—	10
(a) General	83	41	2	—	11	—	19	—	—	—	10
(b) Hydraulic, pneumatic, and other	76	8	21	1	—	—	43	—	3	—	—
(2) Optical and photographic instruments	386	11	6	—	—	1	6	361	—	—	1
(3) General and other	50	19	—	2	—	—	—	7	4	—	18
d. Science laboratory equipment n.e.c.	688	130	372	—	76	—	13	36	36	—	25
(1) Chemical laboratory[b]	33	—	—	—	—	—	—	—	—	—	—
(2) Physics laboratory, nuclear[b]	462	—	—	—	—	—	—	—	—	—	—
(3) Physics laboratory, other[b]	29	—	—	—	—	—	—	—	—	—	—
(4) Biological or medical laboratory[b]	34	—	—	—	—	—	—	—	—	—	—
(5) General[b]	130	—	—	—	—	—	—	—	—	—	—
2. Machinery, electrical and mechanical equipment	2,933	1,481	189	101	96	14	202	340	119	27	364
a. Electrical equipment	2,262	1,313	90	68	96	11	98	284	72	7	223
(1) Telephone, teletype, and related equipment	749	572	—	—	—	—	13	137	9	1	17
(2) Electric power plant equipment	707	523	25	—	75	9	14	30	14	—	17
(3) Electrical control and signaling equipment	85	8	22	11	8	—	—	34	2	—	—
(4) Electrical equipment, parts, and components n.e.c.	678	210	41	57	13	2	68	48	44	6	189
(5) Combination: control, signaling, and other equipment n.e.c.	43	—	2	—	—	—	3	35	3	—	—
b. Nonelectrical machinery and other metal equipment	671	168	99	33	—	3	104	56	47	20	141
(1) Tool and die	41	—	22	4	—	—	5	5	1	4	—
(2) Manufacturing and mining machinery and equipment n.e.c.	288	78	76	29	—	2	20	33	21	—	29
(3) Chemical processing machinery and equipment	145	—	—	—	—	—	43	7	—	3	92
(4) Construction machinery and equipment	2	—	—	—	—	—	—	—	—	—	2
(5) Agricultural machinery and equipment	—	—	—	—	—	—	—	—	—	—	—

Continued

Table 12. PRODUCT OR EQUIPMENT WORKED ON BY ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS WHOSE FUNCTION IS (A) DESIGN, (B) DEVELOPMENT, AND (C) TROUBLESHOOTING, BY AREA[a]

(Number in technical occupations)

Product or equipment worked on	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Rochester	Syracuse	Utica	All other
Development (continued)											
(6) Warehouse equipment and other material moving machinery	2	—	—	—	—	—	—	—	—	—	—
(7) Heating, air conditioning, and related machinery and equipment	61	4	—	—	—	—	29	3	19	6	—
(8) General and other	132	86	1	—	—	1	7	8	6	7	16
3. Transportation equipment, aircraft, and ordnance	878	196	331	2	21	—	219	64	13	1	31
a. Aircraft and missile parts and equipment n.e.c.	707	178	330	—	21	—	160	—	10	1	7
(1) Aircraft electronic-electrical systems n.e.c.[b]	277	—	—	—	—	—	—	—	—	—	—
(2) Jet engine[b]	—	—	—	—	—	—	—	—	—	—	—
(3) Rocket engine[b]	110	—	—	—	—	—	—	—	—	—	—
(4) Other aircraft engine[b]	—	—	—	—	—	—	—	—	—	—	—
(5) Aircraft mechanical equipment and systems[b]	73	—	—	—	—	—	—	—	—	—	—
(6) Missile equipment[b]	200	—	—	—	—	—	—	—	—	—	—
(7) General[b]	47	—	—	—	—	—	—	—	—	—	—
b. Transportation vehicles and equipment n.e.c.	168	18	—	2	—	—	59	62	3	—	24
(1) Ships and ship equipment	7	7	—	—	—	—	—	—	—	—	—
(2) Motor vehicles and equipment	155	11	—	2	—	—	53	62	3	—	24
(3) Railroad vehicles and equipment	6	—	—	—	—	—	6	—	—	—	—
c. Ordnance	3	—	1	—	—	—	—	2	—	—	—
4. Other products and equipment	42	5	9	4	3	—	9	1	5	1	5
a. Nonmetal cartons and containers	8	1	—	—	—	—	3	—	—	—	4
b. Other	34	4	9	4	3	—	6	1	5	1	1
Troubleshooting											
All products or equipment worked on	22,406	9,230	4,855	810	840	895	1,482	691	898	727	1,978
1. Instruments and electronic and science laboratory equipment	12,278	3,259	3,751	340	545	796	688	496	543	580	1,280
a. Electronic equipment and instruments	9,327	2,287	2,430	328	503	626	493	357	534	571	1,198
(1) Communications equipment	2,760	1,268	778	102	94	63	74	17	63	180	121
(a) Radio, television, audio	982	507	223	26	85	6	19	4	—	40	72
(b) Radar, sonar, microwave	625	141	406	—	—	—	18	—	—	60	—
(c) Other and combinations	1,153	620	149	76	9	57	37	13	63	80	49
(2) Digital computers	3,773	656	518	111	279	466	303	163	171	216	890
(3) Testing, measuring, and control instruments	1,074	254	396	33	15	31	68	41	100	28	108
(4) Electronic components	615	76	185	82	108	65	43	—	2	—	54
(5) General and other	1,105	33	353	—	7	1	5	136	198	147	25
b. Electronic-mechanical instruments	2,154	666	1,000	12	33	157	149	66	4	9	58
(1) Industrial servo-control instruments, fire control, guidance, and other analog applications	1,145	125	799	9	—	70	113	—	—	—	29

Continued

Table 12. PRODUCT OR EQUIPMENT WORKED ON BY ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS WHOSE FUNCTION IS (A) DESIGN, (B) DEVELOPMENT, AND (C) TROUBLESHOOTING, BY AREA[a]

(Number in technical occupations)

Product or equipment worked on	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Rochester	Syracuse	Utica	All other
Troubleshooting (continued)											
(2) Testing, measuring, and control instruments, other than servo	826	401	161	3	33	87	35	66	3	9	28
(3) General and other	183	140	40	—	—	—	1	—	1	—	1
c. Mechanical instruments	503	174	183	—	1	13	44	61	5	—	22
(1) Testing, measuring, and control instruments	331	92	176	—	1	11	35	—	4	—	12
(a) General	267	88	129	—	1	11	26	—	—	—	12
(b) Hydraulic, pneumatic, and other	64	4	47	—	—	—	9	—	4	—	—
(2) Optical and photographic instruments	81	6	5	—	—	—	5	61	—	—	4
(3) General and other	91	76	2	—	—	2	4	—	1	—	6
d. Science laboratory equipment n.e.c.	294	132	138	—	8	—	2	12	—	—	2
(1) Chemical laboratory[b]	1	—	—	—	—	—	—	—	—	—	—
(2) Physics laboratory, nuclear[b]	147	—	—	—	—	—	—	—	—	—	—
(3) Physics laboratory, other[b]	23	—	—	—	—	—	—	—	—	—	—
(4) Biological or medical laboratory[b]	6	—	—	—	—	—	—	—	—	—	—
(5) General[b]	117	—	—	—	—	—	—	—	—	—	—
2. Machinery, electrical and mechanical equipment	8,117	4,716	575	457	251	91	696	189	346	112	684
a. Electrical equipment	7,308	4,312	523	443	245	60	612	149	328	91	545
(1) Telephone, teletype, and related equipment	5,206	3,238	489	374	141	24	235	108	140	52	405
(2) Electric power plant equipment	93	—	—	—	51	—	26	1	11	—	4
(3) Electrical control and signaling equipment	1,333	799	16	29	52	17	164	40	81	39	96
(4) Electrical equipment, parts, and components n.e.c.	459	167	18	34	—	19	153	—	31	—	37
(5) Combination: control, signaling, and other equipment n.e.c.	217	108	—	6	1	—	34	—	65	—	3
b. Nonelectrical machinery and other metal equipment	809	404	52	14	6	31	84	40	18	21	139
(1) Tool and die	122	7	11	—	—	25	25	—	3	8	43
(2) Manufacturing and mining machinery and equipment n.e.c.	209	46	—	14	6	6	27	31	5	10	64
(3) Chemical processing machinery and equipment	69	38	4	—	—	—	13	6	4	3	1
(4) Construction machinery and equipment	13	5	—	—	—	—	—	—	—	—	8
(5) Agricultural machinery and equipment	6	—	—	—	—	—	—	—	—	—	6
(6) Warehouse equipment and other material moving machinery	8	—	—	—	—	—	—	—	—	—	8
(7) Heating, air conditioning, and related machinery and equipment	330	285	35	—	—	—	6	—	4	—	—
(8) General and other	52	23	2	—	—	—	13	3	2	—	9

Continued

Table. 12 PRODUCT OR EQUIPMENT WORKED ON BY ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS WHOSE FUNCTION IS (A) DESIGN, (B) DEVELOPMENT, AND (C) TROUBLESHOOTING, BY AREA[a]

(Number in technical occupations)

Prcduct or equipment worked on	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Rochester	Syracuse	Utica	All other
Troubleshooting (continued)											
3. Transportation equipment, aircraft, and ordnance	1,977	1,251	529	13	43	—	93	2	9	35	2
a. Aircraft and missile parts and equipment n.e.c.	1,804	1,152	516	9	4	—	86	—	—	35	2
(1) Aircraft electronic-electrical systems n.e.c.[b]	617	—	—	—	—	—	—	—	—	—	—
(2) Jet engine[b]	70	—	—	—	—	—	—	—	—	—	—
(3) Rocket engine[b]	—	—	—	—	—	—	—	—	—	—	—
(4) Other aircraft engine[b]	34	—	—	—	—	—	—	—	—	—	—
(5) Aircraft mechanical equipment and systems[b]	54	—	—	—	—	—	—	—	—	—	—
(6) Missile equipment[b]	31	—	—	—	—	—	—	—	—	—	—
(7) General[b]	998	—	—	—	—	—	—	—	—	—	—
b. Transportation vehicles and equipment n.e.c.	153	99	—	4	39	—	1	1	9	—	—
(1) Ships and ship equipment	87	87	—	—	—	—	—	—	—	—	—
(2) Motor vehicles and equipment	18	9	—	4	—	—	1	—	4	—	—
(3) Railroad vehicles and equipment	48	3	—	—	39	—	—	1	5	—	—
c. Ordnance	20	—	13	—	—	—	6	1	—	—	—
4. Other products and equipment	34	4	—	—	1	8	5	4	—	—	12
a. Nonmetal cartons and containers	13	—	—	—	—	—	—	3	—	—	10
b. Other	21	4	—	—	1	8	5	1	—	—	2

[a] This table distributes by function data given in table 8.
[b] Area data omitted.

Table 13. PRODUCT OR EQUIPMENT WORKED ON BY ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS WHOSE FUNCTION IS (A) DESIGN, (B) DEVELOPMENT, AND (C) TROUBLESHOOTING, BY INDUSTRY DIVISION[a]

(Number in technical occupations)

Product or equipment worked on	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[b]	Private colleges and schools	Government	All other
Design									
All products or equipment worked on	7,689	6,073	2	273	—	919	33	122	267
1. Instruments and electronic and science laboratory equipment	2,729	2,260	—	—	—	309	31	36	93
a. Electronic equipment and instruments	1,589	1,470	—	—	—	108	—	—	11
(1) Communications equipment	193	181	—	—	—	12	—	—	—
(a) Radio, television, audio	37	37	—	—	—	—	—	—	—
(b) Radar, sonar, microwave	58	46	—	—	—	12	—	—	—
(c) Other and combinations	98	98	—	—	—	—	—	—	—
(2) Digital computers	454	454	—	—	—	—	—	—	—
(3) Testing, measuring, and control instruments	66	63	—	—	—	3	—	—	—
(4) Electronic components	162	158	—	—	—	4	—	—	—
(5) General and other	714	614	—	—	—	89	—	—	11
b. Electronic-mechanical instruments	604	495	—	—	—	80	—	11	18
(1) Industrial servo-control instruments, fire control, guidance, and other analog applications	356	348	—	—	—	8	—	—	—
(2) Testing, measuring, and control instruments, other than servo	66	66	—	—	—	—	—	—	—
(3) General and other	182	81	—	—	—	72	—	11	18
c. Mechanical instruments	372	295	—	—	—	36	—	21	20
(1) Testing, measuring, and control instruments	165	124	—	—	—	2	—	21	18
(a) General	77	55	—	—	—	1	—	21	—
(b) Hydraulic, pneumatic, and other	88	69	—	—	—	1	—	—	18
(2) Optical and photographic instruments	166	165	—	—	—	—	—	—	1
(3) General and other	41	6	—	—	—	34	—	—	1
d. Science laboratory equipment n.e.c.	164	—	—	—	—	85	31	4	44
(1) Chemical laboratory	—	—	—	—	—	—	—	—	—
(2) Physics laboratory, nuclear	133	—	—	—	—	85	4	1	43
(3) Physics laboratory, other	12	—	—	—	—	—	12	—	—
(4) Biological or medical laboratory	4	—	—	—	—	—	—	3	1
(5) General	15	—	—	—	—	—	15	—	—
2. Machinery, electrical and mechanical equipment	4,173	3,341	2	271	—	446	2	37	74
a. Electrical equipment	1,411	851	—	271	—	239	1	2	47
(1) Telephone, teletype, and related equipment	102	5	—	8	—	81	—	—	8
(2) Electric power plant equipment	909	493	—	259	—	152	—	—	5
(3) Electrical control and signaling equipment	23	18	—	4	—	—	—	1	—
(4) Electrical equipment, parts, and components n.e.c.	362	321	—	—	—	6	1	—	34
(5) Combination: control, signaling, and other equipment n.e.c.	15	14	—	—	—	—	—	1	—

Continued

Table 13. PRODUCT OR EQUIPMENT WORKED ON BY ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS WHOSE FUNCTION IS (A) DESIGN, (B) DEVELOPMENT, AND (C) TROUBLESHOOTING, BY INDUSTRY DIVISION[a]

(Number in technical occupations)

Product or equipment worked on	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[b]	Private colleges and schools	Government	All other
Design (continued)									
b. Nonelectrical machinery and other metal equipment	2,762	2,490	2	—	—	207	1	35	27
(1) Tool and die	1,670	1,577	—	—	—	54	1	28	10
(2) Manufacturing and mining machinery and equipment n.e.c.	592	574	—	—	—	9	—	7	2
(3) Chemical processing machinery and equipment	121	60	2	—	—	59	—	—	—
(4) Construction machinery and equipment	—	—	—	—	—	—	—	—	—
(5) Agricultural machinery and equipment	15	15	—	—	—	—	—	—	—
(6) Warehouse equipment and other material moving machinery	46	34	—	—	—	—	—	—	12
(7) Heating, air conditioning, and related machinery and equipment	60	24	—	—	—	36	—	—	—
(8) General and other	258	206	—	—	—	49	—	—	3
3. Transportation equipment, aircraft, and ordnance	517	448	—	2	—	21	—	46	—
a. Aircraft and missile parts and equipment n.e.c.	273	264	—	—	—	9	—	—	—
(1) Aircraft electronic-electrical systems n.e.c.	102	94	—	—	—	8	—	—	—
(2) Jet engine	6	6	—	—	—	—	—	—	—
(3) Rocket engine	1	1	—	—	—	—	—	—	—
(4) Other aircraft engine	—	—	—	—	—	—	—	—	—
(5) Aircraft mechanical equipment and systems	106	106	—	—	—	—	—	—	—
(6) Missile equipment	49	49	—	—	—	—	—	—	—
(7) General	9	8	—	—	—	1	—	—	—
b. Transportation vehicles and equipment n.e.c.	187	173	—	2	—	12	—	—	—
(1) Ships and ship equipment	16	4	—	—	—	12	—	—	—
(2) Motor vehicles and equipment	112	112	—	—	—	—	—	—	—
(3) Railroad vehicles and equipment	59	57	—	2	—	—	—	—	—
c. Ordnance	57	11	—	—	—	—	—	46	—
4. Other products and equipment	270	24	—	—	—	143	—	3	100
a. Nonmetal cartons and containers	93	9	—	—	—	84	—	—	—
b. Other	177	15	—	—	—	59	—	3	100
Development									
All products or equipment worked on	11,936	8,873	2	479	9	1,063	357	644	509
1. Instruments and electronic and science laboratory equipment	8,083	6,513	2	45	9	557	250	262	445
a. Electronic equipment and instruments	4,929	4,231	2	45	—	344	42	217	48
(1) Communications equipment	1,720	1,387	2	41	—	112	—	168	10
(a) Radio, television, audio	675	611	—	—	—	14	—	40	10
(b) Radar, sonar, microwave	450	325	2	—	—	65	—	58	—
(c) Other and combinations	595	451	—	41	—	33	—	70	—

Continued

Table 13. PRODUCT OR EQUIPMENT WORKED ON BY ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS WHOSE FUNCTION IS (A) DESIGN, (B) DEVELOPMENT, AND (C) TROUBLESHOOTING, BY INDUSTRY DIVISION[a]

(Number in technical occupations)

Product or equipment worked on	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[b]	Private colleges and schools	Government	All other
Development (continued)									
(2) Digital computers	818	786	—	—	—	32	—	—	—
(3) Testing, measuring, and control instruments	585	494	—	—	—	74	—	11	6
(4) Electronic components	800	771	—	—	—	28	—	1	—
(5) General and other	1,006	793	—	4	—	98	42	37	32
b. Electronic-mechanical instruments	1,871	1,736	—	—	—	117	2	14	2
(1) Industrial servo-control instruments, fire control, guidance, and other analog applications	1,290	1,227	—	—	—	50	—	13	—
(2) Testing, measuring, and control instruments, other than servo	281	228	—	—	—	51	—	—	2
(3) General and other	300	281	—	—	—	16	2	1	—
c. Mechanical instruments	595	530	—	—	—	35	12	3	15
(1) Testing, measuring, and control instruments	159	134	—	—	—	16	—	—	9
(a) General	83	68	—	—	—	15	—	—	—
(b) Hydraulic, pneumatic, and other	76	66	—	—	—	1	—	—	9
(2) Optical and photographic instruments	386	376	—	—	—	4	—	—	6
(3) General and other	50	20	—	—	—	15	12	3	—
d. Science laboratory equipment n.e.c.	688	16	—	—	9	61	194	28	380
(1) Chemical laboratory	33	—	—	—	—	—	33	—	—
(2) Physics laboratory, nuclear	462	—	—	—	—	61	10	19	372
(3) Physics laboratory, other	29	—	—	—	—	—	25	—	4
(4) Biological or medical laboratory	34	—	—	—	9	—	16	8	1
(5) General	130	16	—	—	—	—	110	1	3
2. Machinery, electrical and mechanical equipment	2,933	1,609	—	348	—	436	97	380	63
a. Electrical equipment	2,262	988	—	348	—	417	96	355	58
(1) Telephone, teletype, and related equipment	749	227	—	129	—	353	—	—	40
(2) Electric power plant equipment	707	95	—	217	—	47	—	348	—
(3) Electrical control and signaling equipment	85	70	—	—	—	11	2	1	1
(4) Electrical equipment, parts, and components n.e.c.	678	555	—	—	—	6	94	6	17
(5) Combination: control, signaling, and other equipment n.e.c.	43	41	—	2	—	—	—	—	—
b. Nonelectrical machinery and other metal equipment	671	621	—	—	—	19	1	25	5
(1) Tool and die	41	41	—	—	—	—	—	—	—
(2) Manufacturing and mining machinery and equipment n.e.c.	288	287	—	—	—	1	—	—	—
(3) Chemical processing machinery and equipment	145	145	—	—	—	—	—	—	—
(4) Construction machinery and equipment	2	2	—	—	—	—	—	—	—
(5) Agricultural machinery and equipment	—	—	—	—	—	—	—	—	—

Continued

Table 13. PRODUCT OR EQUIPMENT WORKED ON BY ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS WHOSE FUNCTION IS (A) DESIGN, (B) DEVELOPMENT, AND (C) TROUBLESHOOTING, BY INDUSTRY DIVISION[a]

(Number in technical occupations)

Product or equipment worked on	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[b]	Private colleges and schools	Government	All other
Development (continued)									
(6) Warehouse equipment and other material moving machinery	2	2	—	—	—	—	—	—	—
(7) Heating, air conditioning, and related machinery and equipment	61	59	—	—	—	2	—	—	—
(8) General and other	132	85	—	—	—	16	1	25	5
3. Transportation equipment, aircraft, and ordnance	878	720	—	86	—	63	6	2	1
a. Aircraft and missile parts and equipment n.e.c.	707	557	—	86	—	63	—	—	1
(1) Aircraft electronic-electrical systems n.e.c.	277	188	—	85	—	4	—	—	—
(2) Jet engine	—	—	—	—	—	—	—	—	—
(3) Rocket engine	110	110	—	—	—	—	—	—	—
(4) Other aircraft engine	—	—	—	—	—	—	—	—	—
(5) Aircraft mechanical equipment and systems	73	55	—	—	—	17	—	—	1
(6) Missile equipment	200	187	—	—	—	13	—	—	—
(7) General	47	17	—	1	—	29	—	—	—
b. Transportation vehicles and equipment n.e.c.	168	160	—	—	—	—	6	2	—
(1) Ships and ship equipment	7	1	—	—	—	—	6	—	—
(2) Motor vehicles and equipment	155	153	—	—	—	—	—	2	—
(3) Railroad vehicles and equipment	6	6	—	—	—	—	—	—	—
c. Ordnance	3	3	—	—	—	—	—	—	—
4. Other products and equipment	42	31	—	—	—	7	4	—	—
a. Nonmetal cartons and containers	8	7	—	—	—	1	—	—	—
b. Other	34	24	—	—	—	6	4	—	—
Troubleshooting									
All products or equipment worked on	22,406	8,686	150	8,159	4	181	193	1,740	3,293
1. Instruments and electronic and science laboratory equipment	12,278	6,962	18	1,093	4	124	177	946	2,954
a. Electronic equipment and instruments	9,327	5,103	—	514	2	93	26	840	2,749
(1) Communications equipment	2,760	1,136	—	441	—	45	—	798	340
(a) Radio, television, audio	982	368	—	293	—	4	—	155	162
(b) Radar, sonar, microwave	625	474	—	4	—	1	—	146	—
(c) Other and combinations	1,153	294	—	144	—	40	—	497	178
(2) Digital computers	3,773	1,360	—	—	—	8	5	—	2,400
(3) Testing, measuring, and control instruments	1,074	997	—	62	—	7	—	8	—
(4) Electronic components	615	579	—	—	—	27	—	—	9
(5) General and other	1,105	1,031	—	11	2	6	21	34	—

Continued

Table 13. PRODUCT OR EQUIPMENT WORKED ON BY ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS WHOSE FUNCTION IS (A) DESIGN, (B) DEVELOPMENT, AND (C) TROUBLESHOOTING, BY INDUSTRY DIVISION[a]

(Number in technical occupations)

Product or equipment worked on	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[b]	Private colleges and schools	Government	All other
Troubleshooting (continued)									
b. Electronic-mechanical instruments	2,154	1,543	—	518	—	17	—	75	1
(1) Industrial servo-control instruments, fire control, guidance, and other analog applications	1,145	1,062	—	—	—	14	—	69	—
(2) Testing, measuring, and control instruments, other than servo	826	301	—	518	—	3	—	3	1
(3) General and other	183	180	—	—	—	—	—	3	—
c. Mechanical instruments	503	316	18	61	—	14	—	29	65
(1) Testing, measuring, and control instruments	331	182	18	61	—	—	—	8	62
(a) General	267	126	18	61	—	—	—	8	54
(b) Hydraulic, pneumatic, and other	64	56	—	—	—	—	—	—	8
(2) Optical and photographic instruments	81	78	—	—	—	—	—	—	3
(3) General and other	91	56	—	—	—	14	—	21	—
d. Science laboratory equipment n.e.c.	294	—	—	—	2	—	151	2	139
(1) Chemical laboratory	1	—	—	—	—	—	1	—	—
(2) Physics laboratory, nuclear	147	—	—	—	—	—	9	—	138
(3) Physics laboratory, other	23	—	—	—	—	—	23	—	—
(4) Biological or medical laboratory	6	—	—	—	2	—	1	2	1
(5) General	117	—	—	—	—	—	117	—	—
2. Machinery, electrical and mechanical equipment	8,117	994	132	5,878	—	33	14	727	339
a. Electrical equipment	7,308	522	—	5,874	—	31	14	722	145
(1) Telephone, teletype, and related equipment	5,206	2	—	5,077	—	21	—	9	97
(2) Electric power plant equipment	93	41	—	41	—	4	—	6	1
(3) Electrical control and signaling equipment	1,335	50	—	636	—	—	—	646	1
(4) Electrical equipment, parts, and components n.e.c.	459	322	—	10	—	6	14	61	46
(5) Combination: control, signaling, and other equipment n.e.c.	217	107	—	110	—	—	—	—	—
b. Nonelectrical machinery and other metal equipment	809	472	132	4	—	2	—	5	194
(1) Tool and die	122	122	—	—	—	—	—	—	—
(2) Manufacturing and mining machinery and equipment n.e.c.	209	209	—	—	—	—	—	—	—
(3) Chemical processing machinery and equipment	69	21	36	—	—	2	—	—	10
(4) Construction machinery and equipment	13	13	—	—	—	—	—	—	—
(5) Agricultural machinery and equipment	6	6	—	—	—	—	—	—	—
(6) Warehouse equipment and other material moving machinery	8	8	—	—	—	—	—	—	—
(7) Heating, air conditioning, and related machinery and equipment	330	41	96	4	—	—	—	5	184
(8) General and other	52	52	—	—	—	—	—	—	—

Continued

Table 13. PRODUCT OR EQUIPMENT WORKED ON BY ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS WHOSE FUNCTION IS (A) DESIGN, (B) DEVELOPMENT, AND (C) TROUBLESHOOTING, BY INDUSTRY DIVISION[a]

(Number in technical occupations)

Product or equipment worked on	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[b]	Private colleges and schools	Government	All other
Troubleshooting (continued)									
3. Transportation equipment, aircraft, and ordnance	1,977	698	—	1,188	—	24	—	67	—
a. Aircraft and missile parts and equipment n.e.c.	1,804	600	—	1,178	—	18	—	8	—
(1) Aircraft electronic-electrical systems n.e.c.	617	226	—	382	—	9	—	—	—
(2) Jet engine	70	5	—	61	—	4	—	—	—
(3) Rocket engine	—	—	—	—	—	—	—	—	—
(4) Other aircraft engine	34	5	—	29	—	—	—	—	—
(5) Aircraft mechanical equipment and systems	54	33	—	17	—	3	—	1	—
(6) Missile equipment	31	31	—	—	—	—	—	—	—
(7) General	998	300	—	689	—	2	—	7	—
b. Transportation vehicles and equipment n.e.c.	153	78	—	10	—	6	—	59	—
(1) Ships and ship equipment	87	30	—	—	—	6	—	51	—
(2) Motor vehicles and equipment	18	10	—	—	—	—	—	8	—
(3) Railroad vehicles and equipment	48	38	—	10	—	—	—	—	—
c. Ordnance	20	20	—	—	—	—	—	—	—
4. Other products and equipment	34	32	—	—	—	—	2	—	—
a. Nonmetal cartons and containers	13	13	—	—	—	—	—	—	—
b. Other	21	19	—	—	—	—	2	—	—

[a] This table distributes by function data given in table 9.
[b] Includes architectural as well as engineering service enterprises; research, development, and testing laboratories; and business and management consulting services.

Table 14. SIZE OF ESTABLISHMENT, BY TECHNICAL OCCUPATION GROUP

(Number in technical occupations)

Technical occupation group	Size of establishment (number of employees)										
	All sizes	1-3	4-19	20-49	50-99	100-199	200-499	500-999	1,000-1,999	2,000-4,999	5,000 or more
All technical occupations	148,684	5,798	10,078	9,706	11,937	11,447	15,430	15,936	16,096	18,801	33,455
Draftsmen	20,972	395	2,915	2,555	2,580	2,029	2,884	1,569	1,385	1,804	2,856
Structural design technicians and related specialists	2,516	1	113	282	169	498	324	213	291	52	573
Electro and mechanical engineering technicians	42,031	70	880	1,562	2,676	2,673	3,323	3,333	4,339	6,901	16,274
Mathematics technicians	831	—	20	22	3	3	25	27	105	107	519
Physical science technicians	8,969	21	182	654	1,238	561	854	916	1,121	1,228	2,194
Biological, medical, dental, and related science technicians	25,445	5,035	2,530	1,060	878	1,045	2,668	4,325	2,927	2,908	2,069
Industrial engineering technicians and related specialists	6,901	4	58	219	226	547	803	684	908	1,184	2,268
Civil engineering and construction technicians and specialists	13,464	207	2,103	1,333	2,232	1,050	1,430	1,442	1,393	834	1,440
Sales and service technicians	1,932	—	600	126	216	352	207	88	131	75	137
Technical writing and illustration specialists	3,034	1	14	392	395	167	496	175	348	297	749
Safety and sanitation inspectors and related specialists	4,084	29	94	164	242	389	310	518	929	597	812
Product testing and inspection specialists	8,059	3	218	558	485	740	1,209	1,099	1,038	629	2,080
Data-processing systems analysis and programming specialists	6,153	—	2	247	247	696	759	909	634	1,235	1,424
Airway tower specialists and flight dispatchers	1,373	2	42	173	98	76	10	548	321	54	49
Broadcasting, motion picture, and recording studio specialists	2,920	30	307	359	252	621	128	90	226	896	11

Table 15. GRADE, BY SIZE OF ESTABLISHMENT

(Number in technical occupations)

Size of establishment (number of employees)	All grades	Supervisory grades	Nonsupervisory grades				Grading system not reported
			Single grade only	Multi-grade			
				Lowest grades	Middle grades	Highest grades	
All sizes	148,684	7,281	75,909	24,197	11,875	22,875	6,547
1- 3	5,798	38	5,691	44	1	24	—
4- 19	10,078	332	8,950	362	73	352	9
20- 49	9,706	467	7,124	833	304	937	41
50- 99	11,937	549	7,653	1,613	620	1,502	—
100- 199	11,447	642	7,631	1,232	483	1,439	20
200- 499	15,430	852	9,177	2,265	754	2,326	56
500- 999	15,936	982	6,890	3,150	1,415	3,196	303
1,000-1,999	16,096	981	5,241	3,968	1,873	3,374	659
2,000-4,999	18,801	969	5,824	4,081	2,023	3,559	2,345
5,000 or more	33,455	1,469	11,728	6,649	4,329	6,166	3,114

Table 16. MEDIAN SIZE OF ESTABLISHMENTS IN WHICH PERSONS IN SPECIFIED TECHNICAL OCCUPATION GROUPS ARE EMPLOYED, BY GRADE STRUCTURE

(Based on total employment in establishment)

Techncial occupation group	All grades	Structure	
		Single grade only	Multi-grade
All technical occupations	812	333	1,710
Draftsmen	201	64	874
Structural design technicians and related specialists	381	106	589
Electro and mechanical engineering technicians	2,939	1,465	4,081
Mathematics technicians	5,997	6,724	2,906
Physical science technicians	1,052	793	1,770
Biological, medical, dental, and related science technicians	445	108	1,213
Industrial engineering technicians and related specialists	2,004	809	4,441
Civil engineering and construction technicians and related specialists	182	71	1,305
Sales and service technicians	107	113	35
Technicial writing and illustration specialists	649	181	2,391
Safety and sanitation inspectors and related specialists	1,319	439	1,691
Product testing and inspection specialists	871	393	1,845
Data-processing systems analysis and programming specialists	1,341	455	3,486
Airway tower specialists and flight dispatchers	760	1,067	709
Broadcasting, motion picture, and recording studio specialists	182	143	2,911

Table 17. NUMBER OF PERSONS AT EACH GRADE LEVEL, BY DETAILED TECHNICAL OCCUPATION

Technical occupation	All grades	Supervisory grades		Nonsupervisory grades						Grading system not reported
		Primarily	Plus technical duties	Single grade only	Two grades		Three or more grades			
					Lower	Higher	Lowest	Middle	Highest	
All technical occupations	148,684	903	6,378	75,909	15,068	12,868	9,129	11,875	10,007	6,547
I. Draftsmen	20,972	65	471	10,564	1,948	2,099	1,230	2,239	2,063	293
A. Architectural and structural	6,294	2	132	4,080	445	536	188	428	483	—
1. Construction	5,973	2	129	3,800	436	531	186	415	474	—
a. Architectural	3,508	1	69	2,122	288	369	119	234	306	—
b. Structural	1,955	1	52	1,433	86	96	49	119	119	—
c. Combination: architectural and structural	510	—	8	245	62	66	18	62	49	—
2. Aircraft structures	105	—	2	81	9	5	—	5	3	—
3. Ship structures	216	—	1	199	—	—	2	8	6	—
B. Electrical-electronic	2,301	11	18	1,042	342	202	158	289	239	—
1. Construction	684	—	—	204	47	34	77	191	131	—
2. Other	1,617	11	18	838	295	168	81	98	108	—
C. Mechanical	6,526	24	153	3,581	671	690	321	572	482	32
1. Construction	1,020	—	8	739	58	59	18	84	54	—
2. Other	5,506	24	145	2,842	613	631	303	488	428	32
D. Electro-mechanical	3,767	16	90	862	352	544	323	710	609	261
1. Construction	211	—	4	82	33	30	27	17	18	—
2. Other	3,556	16	86	780	319	514	296	693	591	261
E. Highway, street, and related construction	270	—	2	98	22	34	74	24	16	—
F. Map, topographical, and geological	592	1	13	382	56	39	39	36	26	—
G. Plant layout	422	1	21	254	13	23	33	59	18	—
H. General draftsmen	661	10	35	203	45	29	90	111	138	—
I. Draftsmen n.e.c.	139	—	7	62	2	2	4	10	52	—
II. Structural design technicians and related specialists	2,516	11	130	920	283	593	125	227	227	—
A. Construction	2,004	9	121	789	283	593	50	50	109	—
1. Architectural	349	—	13	218	37	35	11	12	23	—
2. Structural	337	4	17	74	40	104	19	26	53	—
3. Combination: architectural and structural	71	—	8	27	5	31	—	—	—	—
4. Electrical	186	—	13	105	24	44	—	—	—	—
5. Mechanical	467	3	24	188	53	171	3	7	18	—
6. Combination: electrical and mechanical	162	1	13	66	33	49	—	—	—	—
7. Highway, street, and related construction n.e.c.	76	1	5	17	20	33	—	—	—	—
8. General construction	356	—	28	94	71	126	17	5	15	—
B. Aircraft structure	427	2	9	103	—	—	21	175	117	—
1. Design	261	—	—	—	—	—	14	162	85	—
2. Lofting	166	2	9	103	—	—	7	13	32	—
C. Ship structure	85	—	—	28	—	—	54	2	1	—
1. Design	28	—	—	28	—	—	—	—	—	—
2. Lofting	57	—	—	—	—	—	54	2	1	—

Continued

Table 17. NUMBER OF PERSONS AT EACH GRADE LEVEL, BY DETAILED TECHNICAL OCCUPATION

Technical occupation	All grades	Supervisory grades		Nonsupervisory grades						Grading system not reported
		Primarily	Plus technical duties	Single grade only	Two grades		Three or more grades			
					Lower	Higher	Lowest	Middle	Highest	
III. Electro and mechanical engineering technicians	42,031	436	1,652	20,087	3,764	3,820	2,421	3,193	3,172	3,486
1. Design	7,689	27	298	2,570	1,037	1,095	752	1,017	836	57
2. Development	11,936	175	240	4,892	1,033	901	606	1,176	1,229	1,684
3. Troubleshooting	22,406	234	1,114	12,625	1,694	1,824	1,063	1,000	1,107	1,745
A. Electronic	10,791	121	431	3,906	1,270	1,169	453	887	1,056	1,498
1. Design	489	—	2	101	117	160	32	46	31	—
2. Development	4,873	52	104	1,778	453	449	117	472	472	976
3. Troubleshooting	5,429	69	325	2,027	700	560	304	369	553	522
B. Electrical	8,794	51	310	4,468	745	821	742	687	567	403
1. Design	1,006	3	28	165	112	101	190	207	197	3
2. Development	2,497	21	26	1,222	173	204	177	253	201	220
3. Troubleshooting	5,291	27	256	3,081	460	516	375	227	169	180
C. Mechanical	8,461	42	284	3,783	902	961	569	814	682	424
1. Design	4,450	13	190	1,950	532	600	240	464	407	54
2. Development	2,092	22	41	850	183	161	200	231	180	224
3. Troubleshooting	1,919	7	53	983	187	200	129	119	95	146
D. Electro-mechanical	13,985	222	627	7,930	847	869	657	805	867	1,161
1. Design	1,744	11	78	354	276	234	290	300	201	—
2. Development	2,474	80	69	1,042	224	87	112	220	376	264
3. Troubleshooting	9,767	131	480	6,534	347	548	255	285	290	897
IV. Mathematics technicians	831	—	46	460	19	19	110	85	38	54
V. Physical science technicians	8,969	18	215	3,160	740	656	1,494	1,480	720	486
A. Chemical and related	5,162	2	88	2,078	524	566	732	723	274	175
1. Pharmaceuticals	363	—	—	110	52	145	20	29	7	—
2. Fuels	338	—	17	46	26	33	129	69	18	—
3. Beverages and other food products	478	—	—	266	88	39	33	45	7	—
4. Industrial and other chemicals	3,983	2	71	1,656	358	349	550	580	242	175
B. Metallurgical and related	987	5	20	446	46	46	102	113	77	132
C. Physics-chemical	1,638	9	22	191	126	28	531	498	213	20
D. Physics, radiation, and nuclear	761	1	22	281	30	14	102	84	68	159
E. Meteorology	185	1	57	49	—	—	14	32	32	—
F. Minerals and soil	140	—	6	41	—	—	13	27	53	—
G. Other	96	—	—	74	14	2	—	3	3	—
VI. Biological, medical, dental, and related science technicians	25,445	12	1,027	16,992	2,358	1,668	858	1,217	797	516
A. Agricultural and related	340	—	2	124	119	85	—	6	4	—
B. Biological and medical laboratory	9,898	3	472	5,044	1,290	881	525	719	465	499
1. Bacteriology (microbiology)	727	—	44	340	68	141	29	58	47	—
2. Biochemistry	837	—	43	339	150	120	51	65	69	—
3. Tissue (histology)	428	—	23	239	58	41	27	17	23	—
4. Cytology	122	—	3	35	13	15	20	17	19	—

Continued

Table 17. NUMBER OF PERSONS AT EACH GRADE LEVEL, BY DETAILED TECHNICAL OCCUPATION

Technical occupation	All grades	Supervisory grades		Nonsupervisory grades						Grading system not reported
		Primarily	Plus technical duties	Single grade only	Two grades		Three or more grades			
					Lower	Higher	Lowest	Middle	Highest	
VI. Biological, medical, dental, and related science technicians (continued)										
5. Hematology	617	—	24	349	90	44	27	43	40	—
6. Blood bank	380	—	39	247	38	31	8	8	9	—
7. Serology	106	—	3	78	5	4	3	2	11	—
8. General and other	6,681	3	293	3,417	868	485	360	509	247	499
C. General medical assistants, doctor's office (other than nurse or secretary)	1,114	—	—	1,114	—	—	—	—	—	—
D. X-ray and related equipment technicians	3,013	3	200	1,681	543	301	67	126	84	8
E. Other medical technicians	1,801	—	45	1,438	87	37	65	60	69	—
1. Electrocardiograph	548	—	9	432	47	15	10	16	19	—
2. Electroencephalograph	159	—	5	137	3	3	2	6	3	—
3. Inhalation therapy	153	—	1	136	5	3	3	3	2	—
4. Other	941	—	30	733	32	16	50	35	45	—
F. Therapists	1,883	4	147	1,069	155	87	172	186	63	—
1. Physical	1,003	2	102	614	130	74	22	42	17	—
2. Occupational, recreational, and other	880	2	45	455	25	13	150	144	46	—
G. Medical record librarians	347	1	54	216	43	16	5	6	6	—
H. Dental laboratory technicians	2,844	1	105	2,190	110	257	14	58	100	9
1. Ceramists	216	—	9	148	5	23	3	26	2	—
2. Dental mechanics	2,628	1	96	2,042	105	234	11	32	98	9
I. Dental hygienists	1,874	—	1	1,843	10	3	1	14	2	—
J. Dental assistants	2,331	—	1	2,273	1	1	9	42	4	—
VII. Industrial engineering technicians and related specialists	6,901	59	531	3,018	559	573	166	702	504	789
A. Industrial engineering technicians	2,224	9	96	1,019	232	344	81	157	139	147
1. Time and motion study men and standards setters	1,104	4	28	613	111	126	42	63	39	78
2. Industrial process methods men	825	1	23	311	110	195	17	61	38	69
3. General	295	4	45	95	11	23	22	33	62	—
B. Quality control and reliability technicians	1,279	17	240	319	167	83	19	128	120	186
C. Production planners, estimators, and related specialists	2,918	30	140	1,429	131	116	64	383	171	454
1. Production planners	993	9	33	319	34	38	35	260	64	201
2. Production cost estimators	395	—	14	320	10	21	6	17	6	1
3. Production schedulers, coordinators, and expediters	515	10	17	306	40	38	7	24	6	67
4. Parts, equipment, and materials estimators, standardizers, coordinators, and catalogers	623	8	31	263	33	13	12	43	35	185
5. General	392	3	45	221	14	6	4	39	60	—
D. Equipment specialists	480	3	55	251	29	30	2	34	74	2
1. Electro equipment and systems	132	1	9	99	—	—	2	8	11	2
2. Industrial machinery, equipment, and tools	39	—	—	32	1	1	—	1	4	—
3. Ship and marine equipment	57	—	8	39	—	—	—	—	10	—

Continued

Table 17. NUMBER OF PERSONS AT EACH GRADE LEVEL, BY DETAILED TECHNICAL OCCUPATION

Technical occupation	All grades	Supervisory grades		Nonsupervisory grades						Grading system not reported
		Primarily	Plus technical duties	Single grade only	Two grades		Three or more grades			
					Lower	Higher	Lowest	Middle	Highest	
VII. Industrial engineering technicians and related specialists (continued)										
4. Aircraft, missiles, and automotive equipment	26	1	1	8	11	5	—	—	—	—
5. Ordnance	44	—	7	—	—	—	—	9	28	—
6. General and other	182	1	30	73	17	24	—	16	21	—
VIII. Civil engineering and construction technicians and specialists	13,464	21	472	7,945	1,453	1,039	758	1,066	710	—
A. Surveyors and related specialists	2,381	4	147	2,004	76	52	10	39	49	—
1. Surveyors	1,171	4	143	939	45	32	1	4	3	—
2. Instrumentmen	1,007	—	—	902	27	19	7	27	25	—
3. General and other	203	—	4	163	4	1	2	8	21	—
B. Civil engineering and construction technicians	4,932	11	156	2,221	560	435	521	569	459	—
1. Buildings	1,765	11	81	1,009	345	302	—	7	10	—
2. Highway, street, and other heavy construction	983	—	5	558	157	71	76	30	86	—
3. General and other	2,184	—	70	654	58	62	445	532	363	—
C. Construction inspectors	2,804	6	75	1,081	648	367	194	306	127	—
1. Building structures	1,126	—	21	403	403	241	14	39	5	—
2. Electrical and mechanical equipment	498	2	21	89	108	31	140	89	18	—
3. Plumbing	214	—	5	80	66	59	2	1	1	—
4. Heating, air conditioning, and related equipment	54	—	1	48	2	3	—	—	—	—
5. General and other	912	4	27	461	69	33	38	177	103	—
D. Construction specification writers and cost estimators	3,347	—	94	2,639	169	185	33	152	75	—
1. Specification writers	117	—	6	46	7	20	3	15	20	—
a. Architectural and structural	72	—	3	44	1	3	1	9	11	—
b. Mechanical and electrical	25	—	3	1	1	3	2	6	9	—
c. Highway, street, and related construction	20	—	—	1	5	14	—	—	—	—
2. Cost estimators	2,898	—	85	2,423	162	165	12	29	22	—
a. Architectural and structural	1,426	—	70	1,085	120	103	10	26	12	—
b. Mechanical and electrical	841	—	10	779	26	26	—	—	—	—
c. Highway, street, and related construction	361	—	1	337	4	19	—	—	—	—
d. General	270	—	4	222	12	17	2	3	10	—
3. Combination: specification writers and cost estimators	332	—	3	170	—	—	18	108	33	—
a. Architectural and structural	92	—	2	90	—	—	—	—	—	—
b. Mechanical and electrical	161	—	—	2	—	—	18	108	33	—
c. Highway, street, and related construction	64	—	—	64	—	—	—	—	—	—
d. General and other	15	—	1	14	—	—	—	—	—	—
IX. Sales and service technicians	1,932	2	44	1,695	110	76	1	3	1	—
X. Technical writing and illustration specialists	3,034	35	220	1,349	247	239	289	211	249	195
A. Technical writers and related specialists	1,906	5	185	860	161	148	178	124	164	81
1. Technical writers and editors	1,669	4	173	658	154	137	178	120	164	81
2. Specifications writers, other than construction	237	1	12	202	7	11	—	4	—	—

Continued

Table 17. NUMBER OF PERSONS AT EACH GRADE LEVEL, BY DETAILED TECHNICAL OCCUPATION

Technical occupation	All grades	Supervisory grades		Nonsupervisory grades						Grading system not reported
		Primarily	Plus technical duties	Single grade only	Two grades		Three or more grades			
					Lower	Higher	Lowest	Middle	Highest	
X. Technical writing and illustration specialists (continued)										
B. Technical illustrators	1,082	28	31	459	86	91	109	86	78	114
C. General and other	46	2	4	30	—	—	2	1	7	—
XI. Safety and sanitation inspectors and related specialists	4,084	18	259	1,156	1,632	626	118	171	100	4
A. Industrial safety and fire prevention	2,253	11	132	788	885	273	65	62	33	4
B. Sanitation	1,771	4	103	368	747	353	53	102	41	—
C. Air safety	60	3	24	—	—	—	—	7	26	—
XII. Product testing and inspection specialists	8,059	89	277	3,720	787	593	802	609	643	539
A. Instruments, meters, and related equipment	2,335	47	68	791	202	211	247	328	215	226
1. Testing, measuring, and control instruments	1,958	40	55	590	133	182	215	315	202	226
a. Electronic-electrical	1,659	36	43	471	114	121	201	304	171	198
b. General and other n.e.c.	299	4	12	119	19	61	14	11	31	28
2. Optical and photographic	145	7	7	80	23	9	2	8	9	—
3. Water, electric, and gas meters	64	—	4	37	18	5	—	—	—	—
4. Weights and measures	168	—	2	84	28	15	30	5	4	—
B. Machinery, transportation and other metal equipment, and appliances n.e.c.	2,762	33	87	1,090	206	198	412	145	282	309
1. Industrial machinery and equipment	755	5	17	241	42	93	42	29	24	262
a. Electronic-electrical	362	1	1	46	2	64	37	19	9	183
b. General and other n.e.c.	393	4	16	195	40	29	5	10	15	79
2. Aircraft equipment	998	12	35	392	24	53	242	31	196	13
3. Automotive equipment	152	—	2	94	50	6	—	—	—	—
4. Office equipment	139	—	3	25	29	16	28	22	16	—
5. Household appliances	112	—	3	46	27	7	2	1	—	26
6. Military equipment	86	1	11	—	—	—	36	31	7	—
7. Metal castings, machined parts, and related materials	520	15	16	292	34	23	62	31	39	8
C. Chemical and other nonmetal products n.e.c.	1,926	2	93	1,223	163	107	122	96	120	—
1. Chemical and related products	846	2	74	512	43	51	42	40	82	—
a. Chemical and petroleum	377	—	1	280	11	20	22	18	25	—
b. Other	469	2	73	232	32	31	20	22	57	—
2. Construction materials	216	—	7	140	29	3	9	20	8	—
3. Paper and related products	315	—	2	138	45	27	59	26	18	—
a. Paper and pulp	239	—	2	95	29	10	59	26	18	—
b. Wood and other	76	—	—	43	16	17	—	—	—	—
4. Rubber and plastic products	166	—	3	148	12	3	—	—	—	—
5. Textiles and related products	314	—	2	240	31	21	10	8	2	—
a. Cloth	170	—	—	106	24	20	10	8	2	—
b. Other	144	—	2	134	7	1	—	—	—	—
6. Other	69	—	5	45	3	2	2	2	10	—

Continued

Table 17. NUMBER OF PERSONS AT EACH GRADE LEVEL, BY DETAILED TECHNICAL OCCUPATION

Technical occupation	All grades	Supervisory grades		Nonsupervisory grades						Grading system not reported
		Primarily	Plus technical duties	Single only grade	Two grades		Three or more grades			
					Lower	Higher	Lowest	Middle	Highest	
XII. Product testing and inspection specialists (continued)										
D. Food and agricultural products	563	—	11	356	103	49	11	22	11	—
1. Milk and milk products	307	—	—	219	24	20	11	22	11	—
2. General and other	256	—	11	137	79	29	—	—	—	—
E. Industrial X-ray and related processes	308	3	10	163	78	11	9	16	14	4
1. Industrial X-ray and radiography	223	2	8	123	56	5	8	8	11	2
2. General and other	85	1	2	40	22	6	1	8	3	2
F. General and other	165	4	8	97	35	17	1	2	1	—
XIII. Data-processing systems analysis and programming specialists	6,153	92	553	2,694	687	734	456	446	306	185
A. Systems analysts	1,875	28	247	1,159	130	148	46	66	47	4
B. Programmers	3,205	13	150	1,068	509	507	311	288	178	181
1. Business and accounting	2,301	9	101	760	417	398	253	207	143	13
2. Engineering and scientific	553	—	20	252	31	37	33	32	11	137
3. Combination: business and engineering	351	4	29	56	61	72	25	49	24	31
C. Combination: systems analysis and programming	936	38	134	421	36	74	80	80	73	—
D. Project planners	137	13	22	46	12	5	19	12	8	—
XIV. Airway tower specialists and flight dispatchers	1,373	17	173	132	23	39	293	220	476	—
A. Airway tower specialists	1,145	11	152	16	2	1	283	210	470	—
B. Flight dispatchers	228	6	21	116	21	38	10	10	6	—
XV. Broadcasting, motion picture, and recording studio specialists	2,920	28	308	2,017	458	94	8	6	1	—
A. Studio technicians	1,521	14	144	1,077	231	48	1	5	1	—
1. Technical directors	96	—	92	4	—	—	—	—	—	—
2. Light	87	—	—	87	—	—	—	—	—	—
3. Audio and acoustics	194	—	2	192	—	—	—	—	—	—
4. Sound effects	61	1	—	50	7	3	—	—	—	—
5. Video control	36	—	—	36	—	—	—	—	—	—
6. Recording	234	1	3	159	27	37	1	5	1	—
7. Studio field	713	2	17	498	190	6	—	—	—	—
8. General	100	10	30	51	7	2	—	—	—	—
B. Video tape and kinescope technicians	194	2	16	113	50	12	—	1	—	—
C. Equipment and maintenance technicians	1,205	12	148	827	177	34	7	—	—	—
1. Transmitter	431	9	80	267	65	10	—	—	—	—
2. Transmission	111	1	21	73	11	5	—	—	—	—
3. Maintenance	315	—	14	174	101	19	7	—	—	—
4. General	348	2	33	313	—	—	—	—	—	—

Table 18. NUMBER OF PERSONS WITH SUPERVISORY FUNCTIONS IN EACH TECHNICAL OCCUPATION GROUP

Technical ocupation group	Total		Supervisory functions			
			With		Without	
	Number	Percent	Number	Percent	Number	Percent
All technical occupations	148,684	100.0	26,539	17.8	122,145	82.2
Draftsmen	20,972	100.0	2,656	12.7	18,316	87.3
Structural design technicians	2,516	100.0	1,004	39.9	1,512	60.1
Electro and mechanical engineering technicians	42,031	100.0	6,706	16.0	35,325	84.0
Field:						
Electronic	10,791	100.0	1,460	13.5	9,331	86.5
Electrical	8,794	100.0	1,236	14.1	7,558	85.9
Mechanical	8,461	100.0	1,568	18.5	6,893	81.5
Electro-mechanical	13,985	100.0	2,442	17.5	11,543	82.5
Function:						
Design	7,689	100.0	1,765	23.0	5,924	77.0
Development	11,936	100.0	2,241	18.8	9,695	81.2
Troubleshooting	22,406	100.0	2,700	12.1	19,706	87.9
Mathematics technicians	831	100.0	99	11.9	732	88.1
Physical science technicians	8,969	100.0	1,145	12.8	7,824	87.2
Biological, medical, dental, and related science technicians	25,445	100.0	3,601	14.2	21,844	85.8
Industrial engineering technicians and related specialists	6,901	100.0	1,231	17.8	5,670	82.2
Civil engineering and construction technicians and specialists	13,464	100.0	5,572	41.4	7,892	58.6
Sales and service technicians	1,932	100.0	260	13.5	1,672	86.5
Technicial writing and illustration specialists	3,034	100.0	581	19.1	2,453	80.9
Safety and sanitation inspectors and related specialists	4,084	100.0	679	16.6	3,405	83.4
Product testing and inspection specialists	8,059	100.0	839	10.4	7,220	89.6
Data-processing systems analysis and programming specialists	6,153	100.0	1,554	25.3	4,599	74.7
Airway tower specialists and flight dispatchers	1,373	100.0	150	10.9	1,233	89.1
Broadcasting, motion picture, and recording studio specialists	2,920	100.0	462	15.8	2,458	84.2

Table 19. NUMBER OF WOMEN IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

Technical occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
All technical occupations	18,335	2,455	6	206	9,756	488	1,441	3,032	951
I. Draftsmen	519	216	—	109	—	179	—	9	6
A. Architectural and structural	91	2	—	2	—	84	—	3	—
1. Construction	79	2	—	—	—	74	—	3	—
a. Architectural	53	—	—	—	—	53	—	—	—
b. Structural	19	—	—	—	—	16	—	3	—
c. Combination: architectural and structural	7	2	—	—	—	5	—	—	—
2. Aircraft structures	—	—	—	—	—	—	—	—	—
3. Ship structures	12	—	—	2	—	10	—	—	—
B. Electrical-electronic	151	24	—	104	—	22	—	1	—
1. Construction	2	—	—	1	—	1	—	—	—
2. Other	149	24	—	103	—	21	—	1	—
C. Mechanical	102	88	—	—	—	12	—	1	1
1. Construction	3	1	—	—	—	2	—	—	—
2. Other	99	87	—	—	—	10	—	1	1
D. Electro-mechanical	137	96	—	3	—	33	—	—	5
1. Construction	—	—	—	—	—	—	—	—	—
2. Other	137	96	—	3	—	33	—	—	5
E. Highway, street, and related construction	3	—	—	—	—	2	—	1	—
F. Map, topographical, and geological	23	1	—	—	—	20	—	2	—
G. Plant layout	5	5	—	—	—	—	—	—	—
H. General draftsmen	6	—	—	—	—	6	—	—	—
I. Draftsmen n.e.c.	1	—	—	—	—	—	—	1	—
II. Structural design technicians and related specialists	22	3	—	—	—	19	—	—	—
A. Construction	19	—	—	—	—	19	—	—	—
1. Architectural	16	—	—	—	—	16	—	—	—
2. Structural	—	—	—	—	—	—	—	—	—
3. Combination: architectural and structural	—	—	—	—	—	—	—	—	—
4. Electrical	1	—	—	—	—	1	—	—	—
5. Mechanical	1	—	—	—	—	1	—	—	—
6. Combination: electrical and mechanical	—	—	—	—	—	—	—	—	—
7. Highway, street, and related construction n.e.c.	—	—	—	—	—	—	—	—	—
8. General construction	1	—	—	—	—	1	—	—	—
B. Aircraft structure	3	3	—	—	—	—	—	—	—
1. Design	3	3	—	—	—	—	—	—	—
2. Lofting	—	—	—	—	—	—	—	—	—
C. Ship structure	—	—	—	—	—	—	—	—	—
1. Design	—	—	—	—	—	—	—	—	—
2. Lofting	—	—	—	—	—	—	—	—	—

Continued

Table 19. NUMBER OF WOMEN IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

Technical occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
III. Electro and mechanical engineering technicians	433	347	2	4	3	50	9	7	11
1. Design	36	23	2	—	—	8	1	—	2
2. Development	292	231	—	1	—	41	6	6	7
3. Troubleshooting	105	93	—	3	3	1	2	1	2
A. Electronic	259	212	—	—	3	27	2	6	9
1. Design	4	—	—	—	—	4	—	—	—
2. Development	192	156	—	—	—	22	1	6	7
3. Troubleshooting	63	56	—	—	3	1	1	—	2
B. Electrical	71	57	—	4	—	8	2	—	—
1. Design	9	9	—	—	—	—	—	—	—
2. Development	37	26	—	1	—	8	2	—	—
3. Troubleshooting	25	22	—	3	—	—	—	—	—
C. Mechanical	58	41	2	—	—	9	5	1	—
1. Design	18	13	2	—	—	2	1	—	—
2. Development	30	20	—	—	—	7	3	—	—
3. Troubleshooting	10	8	—	—	—	—	1	1	—
D. Electro-mechanical	45	37	—	—	—	6	—	—	2
1. Design	5	1	—	—	—	2	—	—	2
2. Development	33	29	—	—	—	4	—	—	—
3. Troubleshooting	7	7	—	—	—	—	—	—	—
IV. Mathematics technicians	357	294	—	—	—	36	26	1	—
V. Physical science technicians	952	601	—	—	5	56	172	41	77
A. Chemical and related	609	412	—	—	—	21	108	23	45
1. Pharmaceuticals	117	111	—	—	—	—	2	2	2
2. Fuels	—	—	—	—	—	—	—	—	—
3. Beverages and other food products	101	97	—	—	—	—	1	1	2
4. Industrial and other chemicals	391	204	—	—	—	21	105	20	41
B. Metallurgical and related	10	10	—	—	—	—	—	—	—
C. Physics-chemical	163	163	—	—	—	—	—	—	—
D. Physics, radiation, and nuclear	158	16	—	—	5	35	59	12	31
E. Meteorology	2	—	—	—	—	—	1	—	1
F. Minerals and soil	2	—	—	—	—	—	—	2	—
G. Other	8	—	—	—	—	—	4	4	—
VI. Biological, medical, dental, and related science technicians	14,584	162	—	8	9,748	32	1,204	2,867	563
A. Agricultural and related	47	—	—	—	—	—	40	7	—
B. Biological and medical laboratory	5,773	142	—	6	3,086	31	1,098	1,049	361
1. Bacteriology (microbiology)	453	84	—	—	282	—	28	52	7
2. Biochemistry	481	38	—	—	326	8	38	65	6
3. Tissue (histology)	283	—	—	—	210	4	9	54	6

Table 19. NUMBER OF WOMEN IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

Technical occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
VI. Biological, medical, dental, and related science technicians (continued)									
4. Cytology	86	—	—	—	74	—	—	8	4
5. Hematology	436	—	—	—	339	1	24	71	1
6. Blood bank	195	—	—	—	172	—	—	22	1
7. Serology	73	—	—	—	55	—	—	18	—
8. General and other	3,766	20	—	6	1,628	18	999	759	336
C. General medical assistants, doctor's office (other than nurse or secretary)	1,077	1	—	—	1,075	—	—	—	1
D. X-ray and related equipment technicians	1,284	9	—	2	997	1	32	204	39
E. Other medical technicians	1,055	7	—	—	863	—	13	164	8
1. Electrocardiograph	463	2	—	—	392	—	6	60	3
2. Electroencephalograph	112	—	—	—	89	—	—	23	—
3. Inhalation therapy	17	—	—	—	9	—	—	8	—
4. Other	463	5	—	—	373	—	7	73	5
F. Therapists	1,083	1	—	—	469	—	16	469	128
1. Physical	549	1	—	—	318	—	7	175	48
2. Occupational, recreational, and other	534	—	—	—	151	—	9	294	80
G. Medical record librarians	313	—	—	—	243	—	—	64	6
H. Dental laboratory technicians	125	—	—	—	118	—	4	2	1
1. Ceramists	4	—	—	—	4	—	—	—	—
2. Dental mechanics	121	—	—	—	114	—	4	2	1
I. Dental hygienists	1,759	2	—	—	968	—	—	772	17
J. Dental assistants	2,068	—	—	—	1,929	—	1	136	2
VII. Industrial engineering technicians and related specialists	66	51	—	5	—	6	1	3	—
A. Industrial engineering technicians	16	8	—	5	—	—	1	2	—
1. Time and motion study men and standards setters	5	5	—	—	—	—	—	—	—
2. Industrial process methods men	3	3	—	—	—	—	—	—	—
3. General	8	—	—	5	—	—	1	2	—
B. Quality control and reliability technicians	17	12	—	—	—	4	—	1	—
C. Production planners, estimators, and related specialists	32	30	—	—	—	2	—	—	—
1. Production planners	1	1	—	—	—	—	—	—	—
2. Production cost estimators	2	2	—	—	—	—	—	—	—
3. Production schedulers, coordinators, and expediters	4	4	—	—	—	—	—	—	—
4. Parts, equipment, and materials estimators, standardizers, coordinators, and catalogers	23	21	—	—	—	2	—	—	—
5. General	2	2	—	—	—	—	—	—	—
D. Equipment specialists	1	1	—	—	—	—	—	—	—
1. Electro equipment and systems	—	—	—	—	—	—	—	—	—
2. Industrial machinery, equipment, and tools	1	1	—	—	—	—	—	—	—
3. Ship and marine equipment	—	—	—	—	—	—	—	—	—

Continued

Table 19. NUMBER OF WOMEN IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

Technical occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
VII. Industrial engineering technicians and related specialists (continued)									
4. Aircraft, missiles, and automotive equipment	—	—	—	—	—	—	—	—	—
5. Ordnance	—	—	—	—	—	—	—	—	—
6. General and other	—	—	—	—	—	—	—	—	—
VIII. Civil engineering and construction technicians and specialists	10	—	4	—	—	5	—	1	—
A. Surveyors and related specialists	1	—	—	—	—	1	—	—	—
1. Surveyors	—	—	—	—	—	—	—	—	—
2. Instrumentmen	—	—	—	—	—	—	—	—	—
3. General and other	1	—	—	—	—	1	—	—	—
B. Civil engineering and construction technicians	3	—	2	—	—	1	—	—	—
1. Buildings	—	—	—	—	—	—	—	—	—
2. Highway, street, and other heavy construction	2	—	2	—	—	—	—	—	—
3. General and other	1	—	—	—	—	1	—	—	—
C. Construction inspectors	1	—	—	—	—	—	—	1	—
1. Building structures	1	—	—	—	—	—	—	1	—
2. Electrical and mechanical equipment	—	—	—	—	—	—	—	—	—
3. Plumbing	—	—	—	—	—	—	—	—	—
4. Heating, air conditioning, and related equipment	—	—	—	—	—	—	—	—	—
5. General and other	—	—	—	—	—	—	—	—	—
D. Construction specification writers and cost estimators	5	—	2	—	—	3	—	—	—
1. Specification writers	1	—	—	—	—	1	—	—	—
a. Architectural and structural	1	—	—	—	—	1	—	—	—
b. Mechanical and electrical	—	—	—	—	—	—	—	—	—
c. Highway, street, and related construction	—	—	—	—	—	—	—	—	—
2. Cost estimators	4	—	2	—	—	2	—	—	—
a. Architectural and structural	4	—	2	—	—	2	—	—	—
b. Mechanical and electrical	—	—	—	—	—	—	—	—	—
c. Highway, street, and related construction	—	—	—	—	—	—	—	—	—
d. General	—	—	—	—	—	—	—	—	—
3. Combination: specification writers and cost estimators	—	—	—	—	—	—	—	—	—
a. Architectural and structural	—	—	—	—	—	—	—	—	—
b. Mechanical and electrical	—	—	—	—	—	—	—	—	—
c. Highway, street, and related construction	—	—	—	—	—	—	—	—	—
d. General and other	—	—	—	—	—	—	—	—	—
IX. Sales and service technicians	10	4	—	—	—	—	—	—	6
X. Technical writing and illustration specialists	217	145	—	2	—	60	3	4	3
A. Technical writers and related specialists	87	57	—	2	—	26	2	—	—
1. Technical writers and editors	87	57	—	2	—	26	2	—	—
2. Specifications writers, other than construction	—	—	—	—	—	—	—	—	—

Continued

Table 19. NUMBER OF WOMEN IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

Technical occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
X. Technical writing and illustration specialists (continued)									
B. Technical illustrators	121	83	—	—	—	33	—	2	3
C. General and other	9	5	—	—	—	1	1	2	—
XI. Safety and sanitation inspectors and related specialists	52	2	—	—	—	—	—	50	—
A. Industrial safety and fire prevention	5	2	—	—	—	—	—	3	—
B. Sanitation	47	—	—	—	—	—	—	47	—
C. Air safety	—	—	—	—	—	—	—	—	—
XII. Product testing and inspection specialists	595	504	—	—	—	30	—	—	61
A. Instruments, meters, and related equipment	162	154	—	—	—	—	—	—	8
1. Testing, measuring, and control instruments	141	133	—	—	—	—	—	—	8
a. Electronic-electrical	93	93	—	—	—	—	—	—	—
b. General and other n.e.c.	48	40	—	—	—	—	—	—	8
2. Optical and photographic	21	21	—	—	—	—	—	—	—
3. Water, electric, and gas meters	—	—	—	—	—	—	—	—	—
4. Weights and measures	—	—	—	—	—	—	—	—	—
B. Machinery, transportation and other metal equipment, and appliances n.e.c.	98	98	—	—	—	—	—	—	—
1. Industrial machinery and equipment	54	54	—	—	—	—	—	—	—
a. Electronic-electrical	30	30	—	—	—	—	—	—	—
b. General and other n.e.c.	24	24	—	—	—	—	—	—	—
2. Aircraft equipment	6	6	—	—	—	—	—	—	—
3. Automotive equipment	17	17	—	—	—	—	—	—	—
4. Office equipment	13	13	—	—	—	—	—	—	—
5. Household appliances	6	6	—	—	—	—	—	—	—
6. Military equipment	—	—	—	—	—	—	—	—	—
7. Metal castings, machined parts, and related materials	2	2	—	—	—	—	—	—	—
C. Chemical and other nonmetal products n.e.c.	216	135	—	—	—	28	—	—	53
1. Chemical and related products	70	64	—	—	—	4	—	—	2
a. Chemical and petroleum	64	60	—	—	—	4	—	—	—
b. Other	6	4	—	—	—	—	—	—	2
2. Construction materials	—	—	—	—	—	—	—	—	—
3. Paper and related products	6	6	—	—	—	—	—	—	—
a. Paper and pulp	4	4	—	—	—	—	—	—	—
b. Wood and other	2	2	—	—	—	—	—	—	—
4. Rubber and plastic products	18	18	—	—	—	—	—	—	—
5. Textiles and related products	122	47	—	—	—	24	—	—	51
a. Cloth	99	24	—	—	—	24	—	—	51
b. Other	23	23	—	—	—	—	—	—	—
6. Other	—	—	—	—	—	—	—	—	—

Continued

Table 19. NUMBER OF WOMEN IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

Technical occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
XII. Product testing and inspection specialists (continued)									
D. Food and agricultural products	110	110	—	—	—	—	—	—	—
1. Milk and milk products	71	71	—	—	—	—	—	—	—
2. General and other	39	39	—	—	—	—	—	—	—
E. Industrial X-ray and related processes	4	4	—	—	—	—	—	—	—
1. Industrial X-ray and radiography	—	—	—	—	—	—	—	—	—
2. General and other	4	4	—	—	—	—	—	—	—
F. General and other	5	3	—	—	—	2	—	—	—
XIII. Data-processing systems analysis and programming specialists	515	124	—	78	—	15	26	48	224
A. Systems analysts	75	15	—	5	—	—	3	8	44
B. Programmers	388	98	—	71	—	13	23	39	144
1. Business and accounting	281	56	—	71	—	4	2	11	137
2. Engineering and scientific	67	29	—	—	—	9	21	1	7
3. Combination: business and engineering	40	13	—	—	—	—	—	27	—
C. Combination: systems analysis and programming	48	11	—	2	—	1	—	1	33
D. Project planners	4	—	—	—	—	1	—	—	3
XIV. Airway tower specialists and flight dispatchers	2	2	—	—	—	—	—	—	—
A. Airway tower specialists	2	2	—	—	—	—	—	—	—
B. Flight dispatchers	—	—	—	—	—	—	—	—	—
XV. Broadcasting, motion picture, and recording studio specialists	1	—	—	—	—	—	—	1	—
A. Studio technicians	1	—	—	—	—	—	—	1	—
1. Technical directors	—	—	—	—	—	—	—	—	—
2. Light	—	—	—	—	—	—	—	—	—
3. Audio and acoustics	—	—	—	—	—	—	—	—	—
4. Sound effects	—	—	—	—	—	—	—	—	—
5. Video control	—	—	—	—	—	—	—	—	—
6. Recording	1	—	—	—	—	—	—	1	—
7. Studio field	—	—	—	—	—	—	—	—	—
8. General	—	—	—	—	—	—	—	—	—
B. Video tape and kinescope technicians	—	—	—	—	—	—	—	—	—
C. Equipment and maintenance technicians	—	—	—	—	—	—	—	—	—
1. Transmitter	—	—	—	—	—	—	—	—	—
2. Transmission	—	—	—	—	—	—	—	—	—
3. Maintenance	—	—	—	—	—	—	—	—	—
4. General	—	—	—	—	—	—	—	—	—

[a] Includes architectural as well as engineering service enterprises; research, development, and testing laboratories; and business and management consulting services.

Table 20. PERCENT DISTRIBUTION OF WOMEN IN SELECTED TECHNICAL OCCUPATIONS ACCORDING TO INDUSTRY DIVISION

Technical occupation	All industries		Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research engineering services [a]	Private colleges and schools	Government	All other
	Number	Percent								
All technical occupations	18,335	100.0	13.4	[b]	1.1	53.2	2.7	7.9	16.5	5.2
Draftsmen	519	100.0	41.6	—	21.0	—	34.5	—	1.7	1.2
Structural design technicians and related specialists	22	100.0	13.6	—	—	—	86.4	—	—	—
Electro and mechanical engineering technicians	433	100.0	80.2	0.5	0.9	0.7	11.5	2.1	1.6	2.5
Mathematics technicians	357	100.0	82.3	—	—	—	10.1	7.3	0.3	—
Physical science technicians	952	100.0	63.1	—	—	0.5	5.9	18.1	4.3	8.1
Chemical and related	609	100.0	67.7	—	—	—	3.4	17.7	3.8	7.4
All other	343	100.0	55.1	—	—	1.5	10.2	18.7	5.2	9.3
Biological, medical, dental, and related science technicians	14,584	100.0	1.1	—	0.1	66.7	0.2	8.3	19.7	3.9
Agricultural and related	47	100.0	—	—	—	—	—	85.1	14.9	—
Biological and medical laboratory	5,773	100.0	2.5	—	0.1	53.4	0.5	19.0	18.2	6.3
General medical assistants, doctor's office (other than nurse or secretary)	1,077	100.0	0.1	—	—	99.8	—	—	—	0.1
X-ray and related equipment technicians	1,284	100.0	0.7	—	0.2	77.6	0.1	2.5	15.9	3.0
Other medical technicians	1,055	100.0	0.7	—	—	81.8	—	1.2	15.5	0.8
Therapists	1,083	100.0	0.1	—	—	43.3	—	1.5	43.3	11.8
Medical record librarians	313	100.0	—	—	—	77.7	—	—	20.4	1.9
Dental laboratory technicians	125	100.0	—	—	—	94.4	—	3.2	1.6	0.8
Dental hygienists	1,759	100.0	0.1	—	—	55.0	—	—	43.9	1.0
Dental assistants	2,068	100.0	—	—	—	93.3	—	[b]	6.6	0.1
Industrial engineering technicians and related specialists	66	100.0	77.3	—	7.6	—	9.1	1.5	4.5	—
Civil engineering and construction technicians and specialists	10	100.0	—	40.0	—	—	50.0	—	10.0	—
Sales and service technicians	10	100.0	40.0	—	—	—	—	—	—	60.0
Technical writing and illustration specialists	217	100.0	66.9	—	0.9	—	27.6	1.4	1.8	1.4
Safety and sanitation inspectors and related specialists	52	100.0	3.8	—	—	—	—	—	96.2	—
Product testing and inspection specialists	595	100.0	84.7	—	—	—	5.0	—	—	10.3
Instruments, meters, and related equipment	162	100.0	95.1	—	—	—	—	—	—	4.9
Machinery, transportation, and other metal equipment, and appliances n.e.c.	98	100.0	100.0	—	—	—	—	—	—	—
Chemical and other nonmetal products n.e.c.	216	100.0	62.5	—	—	—	13.0	—	—	24.5
Food and agricultural products	110	100.0	100.0	—	—	—	—	—	—	—
Data-processing systems analysis and programming specialists	515	100.0	24.1	—	15.1	—	2.9	5.0	9.3	43.6
Systems analysts	75	100.0	20.0	—	6.7	—	—	4.0	10.7	58.6
Programmers	388	100.0	25.3	—	18.3	—	3.4	5.9	10.1	37.0
Combination: systems analysis and programming	48	100.0	22.9	—	4.2	—	2.1	—	2.1	68.7

[a] Includes architectural as well as engineering service enterprises; research, development, and testing laboratories; and business and management consulting services.
[b] Less than 0.05 of a percent.

Table 21. NUMBER OF UNION MEMBERS IN EACH DETAILED TECHNICAL OCCUPATION

Technical occupation	Number employed	Covered by union agreement	
		Number	Percent
All technical occupations	148,684	25,799	17.4
I. Draftsmen	20,972	2,377	11.3
A. Architectural and structural	6,294	191	3.0
1. Construction	5,973	180	3.0
a. Architectural	3,508	1	*
b. Structural	1,955	139	7.1
c. Combination: architectural and structural	510	40	7.8
2. Aircraft structures	105	8	7.6
3. Ship structures	216	3	1.4
B. Electrical-electronic	2,301	872	37.9
1. Construction	684	354	51.8
2. Other	1,617	518	32.0
C. Mechanical	6,526	681	10.4
1. Construction	1,020	97	9.5
2. Other	5,506	584	10.6
D. Electro-mechanical	3,767	560	14.9
1. Construction	211	112	53.1
2. Other	3,556	448	12.6
E. Highway, street and related construction	270	—	—
F. Map, topographical, and geological	592	42	7.1
G. Plant layout	422	10	2.4
H. General draftsmen	661	21	3.2
I. Draftsmen n.e.c.	139	—	—
II. Structural design technicians and related specialists	2,516	82	3.3
A. Construction	2,004	76	3.8
1. Architectural	349	—	—
2. Structural	337	72	21.4
3. Combination: architectural and structural	71	—	—
4. Electrical	186	—	—
5. Mechanical	467	2	0.4
6. Combination: electrical and mechanical	162	—	—
7. Highway, street, and related construction n.e.c.	76	—	—
8. General construction	356	2	0.6
B. Aircraft structure	427	6	1.4
1. Design	261	—	—
2. Lofting	166	6	3.6
C. Ship structure	85	—	—
1. Design	28	—	—
2. Lofting	57	—	—
III. Electro and mechanical engineering technicians	42,031	13,688	32.6
A. Field	42,031	13,688	32.6
1. Electronic	10,791	3,020	28.0
2. Electrical	3,618	1,433	39.6
3. Electronic-electrical	5,176	2,258	43.6
4. Mechanical	8,461	1,614	19.1
5. Electro-mechanical	13,985	5,363	38.3
B. Function	42,031	13,688	32.6
1. Design	7,689	1,040	13.5
2. Development	6,803	1,297	19.1
3. Installation	458	79	17.2
4. Troubleshooting and related functions	18,880	8,515	45.1
5. Combination of design and development	1,392	71	5.1
6. Combination of design and/or development and installing and/or troubleshooting	3,741	1,190	31.8
7. Combination of installing and troubleshooting	3,068	1,496	48.8
IV. Mathematics technicians	831	195	23.5

Continued

Table 21. NUMBER OF UNION MEMBERS IN EACH DETAILED TECHNICAL OCCUPATION

Technical occupation	Number employed	Covered by union agreement	
		Number	Percent
V. Physical science technicians	8,969	925	10.3
A. Chemical and related	5,162	710	13.8
1. Pharmaceuticals	363	138	38.0
2. Fuels	338	25	7.4
3. Beverages and other food products	478	26	5.4
4. Industrial and other chemicals	3,983	521	13.1
B. Metallurgical and related	987	168	17.0
C. Physics-chemical	1,638	3	0.2
D. Physics, radiation, and nuclear	761	19	2.5
E. Meteorology	185	—	—
F. Minerals and soil	140	—	—
G. Other	96	25	26.0
VI. Biological, medical, dental, and related science technicians	25,445	776	3.0
A. Agricultural and related	340	—	—
B. Biological and medical laboratory	9,898	569	5.7
1. Bacteriology (microbiology)	727	103	14.2
2. Biochemistry	837	143	17.1
3. Tissue (histology)	428	46	10.7
4. Cytology	122	36	29.5
5. Hematology	617	40	6.5
6. Blood bank	380	24	6.3
7. Serology	106	3	2.8
8. General and other	6,681	174	2.6
C. General medical assistants, doctor's office (other than nurse or secretary)	1,114	15	1.3
D. X-ray and related equipment technicians	3,013	95	3.2
E. Other medical technicians	1,801	71	3.9
1. Electrocardiograph	548	22	4.0
2. Electroencephalograph	159	4	2.5
3. Inhalation therapy	153	7	4.6
4. Other	941	38	4.0
F. Therapists	1,883	8	0.4
1. Physical	1,003	8	0.8
2. Occupational, recreational, and other	880	—	—
G. Medical record librarians	347	6	1.7
H. Dental laboratory technicians	2,844	6	0.2
1. Ceramists	216	—	—
2. Dental mechanics	2,628	6	0.2
I. Dental hygienists	1,874	3	0.2
J. Dental assistants	2,331	3	0.1
VII. Industrial engineering technicians and related specialists	6,901	496	7.2
A. Industrial engineering technicians	2,224	247	11.1
1. Time and motion study men and standards setters	1,104	96	8.7
2. Industrial process methods men	825	144	17.5
3. General	295	7	2.4
B. Quality control and reliability technicians	1,279	35	2.7
C. Production planners, estimators, and related specialists	2,918	213	7.3
1. Production planners	993	31	3.1
2. Production cost estimators	395	51	12.9
3. Production schedulers, coordinators, and expediters	515	108	21.0
4. Parts, equipment, and materials estimators, standardizers, coordinators and catalogers	623	10	1.6
5. General	392	13	3.3
D. Equipment specialists	480	1	0.2
1. Electro equipment and systems	132	—	—
2. Industrial machinery, equipment, and tools	39	1	2.6
3. Ship and marine equipment	57	—	—
4. Aircraft, missiles, and automotive equipment	26	—	—
5. Ordnance	44	—	—
6. General and other	182	—	—

Continued

Table 21. NUMBER OF UNION MEMBERS IN EACH DETAILED TECHNICAL OCCUPATION

Technical occupation	Number employed	Covered by union agreement	
		Number	Percent
VIII. Civil engineering and construction technicians and specialists	13,464	1,276	9.5
A. Surveyors and related specialists	2,381	383	16.1
1. Surveyors	1,171	119	10.2
2. Instrumentmen	1,007	244	24.2
3. General and other	203	20	9.9
B. Civil engineering and construction technicians	4,932	513	10.4
1. Buildings	1,765	246	13.9
2. Highway, street, and other heavy construction	983	221	22.5
3. General and other	2,184	46	2.1
C. Construction inspectors	2,804	111	4.0
1. Building structures	1,126	—	—
2. Electrical and mechanical equipment	498	15	3.0
3. Plumbing	214	—	—
4. Heating, air conditioning and related equipment	54	1	1.9
5. General and other	912	95	10.4
D. Construction specification writers and cost estimators	3,347	269	8.0
1. Specification writers	117	19	16.2
a. Architectural and structural	72	—	—
b. Mechanical and electrical	25	—	—
c. Highway, street, and related construction	20	19	95.0
2. Cost estimators	2,898	87	3.0
a. Architectural and structural	1,426	22	1.5
b. Mechanical and electrical	841	32	3.8
c. Highway, street, and related construction	361	33	9.1
d. General	270	—	—
3. Combination: specification writers and cost estimators	332	163	49.1
a. Architectural and structural	92	4	4.3
b. Mechanical and electrical	161	159	98.8
c. Highway, street, and related construction	64	—	—
d. General and other	15	—	—
IX. Sales and service technicians	1,932	28	1.4
X. Technical writing and illustration specialists	3,034	111	3.7
A. Technical writers and related specialists	1,906	91	4.8
1. Technical writers and editors	1,669	87	5.2
2. Specifications writers, other than construction	237	4	1.7
B. Technical illustrators	1,082	20	1.8
C. General and other	46	—	—
XI. Safety and sanitation inspectors and related specialists	4,084	9	0.2
A. Industrial safety and fire prevention	2,253	7	0.3
B. Sanitation	1,771	2	0.1
C. Air Safety	60	—	—
XII. Product testing and inspection specialists	8,059	3,343	41.5
A. Instruments, meters, and related equipment	2,335	1,392	59.6
1. Testing, measuring, and control instruments	1,958	1,343	68.6
a. Electronic-electrical	1,659	1,200	72.3
b. General and other n.e.c.	299	143	47.8
2. Optical and photographic	145	35	24.1
3. Water, electric, and gas meters	64	14	21.9
4. Weights and measures	168	—	—
B. Machinery, transportation and other metal equipment, and appliances n.e.c.	2,762	1,442	52.2
1. Industrial machinery and equipment	755	401	53.1
a. Electronic-electrical	362	239	66.0
b. General and other n.e.c.	393	162	41.2
2. Aircraft equipment	998	619	62.0
3. Automotive equipment	152	81	53.3
4. Office equipment	139	7	5.0

Continued

Table 21. NUMBER OF UNION MEMBERS IN EACH DETAILED TECHNICAL OCCUPATION

Technical occupation	Number employed	Covered by union agreement	
		Number	Percent
XII. Product testing and inspection specialists (continued)			
5. Household appliances	112	40	35.7
6. Military equipment	86	—	—
7. Metal castings, machined parts, and related materials	520	294	56.5
C. Chemical and other nonmetal products n.e.c.	1,926	372	19.3
1. Chemical and related products	846	182	21.5
a. Chemical and petroleum	377	31	8.2
b. Other	469	151	32.2
2. Construction materials	216	4	1.9
3. Paper and related products	315	175	55.6
a. Paper and pulp	239	175	73.2
b. Wood and other	76	—	—
4. Rubber and plastic products	166	—	—
5. Textiles and related products	314	5	1.6
a. Cloth	170	5	2.9
b. Other	144	—	—
6. Other	69	6	8.7
D. Food and agricultural products	563	31	5.5
1. Milk and milk products	307	10	3.3
2. General and other	256	21	8.2
E. Industrial X-ray and related processes	308	73	23.7
1. Industrial X-ray and radiography	223	18	8.1
2. General and other	85	55	64.7
F. General and other	165	33	20.0
XIII. Data-processing systems analysis and programming specialists	6,153	48	0.8
A. Systems analysts	1,875	—	—
B. Programmers	3,205	43	1.3
1. Business and accounting	2,301	20	0.9
2. Engineering and scientific	553	23	4.2
3. Combination: business and engineering	351	—	—
C. Combination: systems analysis and programming	936	5	0.5
D. Project planners	137	—	—
XIV. Airway tower specialists and flight dispatchers	1,373	208	15.1
A. Airway tower specialists	1,145	—	—
B. Flight dispatchers	228	208	91.2
XV. Broadcasting, motion picture, and recording studio specialists	2,920	2,237	76.6
A. Studio technicians	1,521	1,230	80.9
1. Technical directors	96	89	92.7
2. Light	87	84	96.6
3. Audio and acoustics	194	124	63.9
4. Sound effects	61	55	90.2
5. Video control	36	36	100.0
6. Recording	234	136	58.1
7. Studio field	713	645	90.5
8. General	100	61	61.0
B. Video tape and kinescope technicians	194	192	99.0
C. Equipment and maintenance technicians	1,205	815	67.6
1. Transmitter	431	131	30.4
2. Transmission	111	110	99.1
3. Maintenance	315	299	94.9
4. General	348	275	79.0

* Less than 0.05 of a percent.

Table 22. UNION MEMBERS AS A PERCENT OF PERSONS IN EACH TECHNICAL OCCUPATION GROUP, BY AREA

Technical occupation group	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bingham-ton	Buffalo	Rochester	Syra-cuse	Utica	All other
All technical occupations	17.4	17.4	26.6	16.8	9.0	2.3	22.4	11.2	19.1	24.8	9.2
Draftsmen	11.3	10.8	21.0	5.8	5.7	0.0	14.5	13.0	7.8	0.0	8.5
Structural design technicians and related specialists	3.3	1.9	0.0	0.0	11.1	0.0	60.0	0.0	16.0	0.0	6.1
Electro and mechanical engineering technicians	32.6	40.4	36.0	24.7	16.0	1.1	48.2	23.4	35.2	50.0	11.4
Field:											
Electronic	28.0	27.1	30.6	17.5	8.2	0.0	50.9	32.0	52.0	57.8	3.1
Electrical	42.0	40.3	41.6	17.8	34.6	0.0	73.2	61.2	56.5	74.8	10.5
Mechanical	19.1	27.2	21.5	9.7	10.4	0.0	36.9	7.9	8.6	12.4	9.3
Electro-mechanical	38.3	54.8	47.4	37.1	13.6	2.6	33.0	11.8	18.9	34.1	21.2
Function:											
Design	13.5	22.1	7.1	8.5	5.2	0.0	46.0	13.1	4.9	0.0	5.5
Development	21.4	11.2	36.0	7.0	5.5	0.0	46.4	27.9	16.8	23.1	3.7
Troubleshooting	45.0	53.0	46.6	35.4	30.8	2.2	50.5	25.3	58.0	71.4	20.5
Mathematics technicians	23.5	9.6	37.8	0.0	2.5	0.0	0.0	12.5	0.0	—	0.0
Physical science technicians	10.3	11.2	16.5	3.9	7.1	0.0	18.4	1.7	5.9	10.3	11.8
Biological, medical, dental, and related science technicians	3.0	4.3	0.6	0.2	1.6	0.0	0.0	0.0	0.0	0.0	5.1
Industrial engineering technicians and related specialists	7.2	5.6	10.3	5.2	1.0	0.0	23.6	1.4	6.3	0.4	5.4
Civil engineering and construction technicians and specialists	9.5	10.9	5.0	21.5	4.6	0.0	4.6	19.3	15.8	10.7	5.6
Sales and service technicians	1.4	1.7	0.0	8.6	0.0	0.0	0.0	0.0	0.0	0.0	2.2
Technical writing and illustration specialists	3.7	4.8	1.5	0.0	0.0	0.0	3.3	21.4	0.0	0.0	2.9
Safety and sanitation inspectors and related specialists	0.2	0.1	0.0	0.0	0.0	0.0	1.4	1.6	0.0	0.0	0.0
Product testing and inspection specialists	41.5	20.5	63.9	61.8	21.6	70.7	43.4	8.6	67.9	63.2	27.2
Data-processing systems analysis and programming specialists	0.8	0.4	7.1	0.0	0.4	0.0	1.5	0.9	2.0	0.0	0.0
Airway tower specialists and flight dispatchers	15.1	37.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.5	0.0
Broadcasting, motion picture, and recording studio specialists	76.6	86.0	0.0	62.5	64.8	0.0	79.7	69.6	0.0	29.7	13.3

Table 23. UNION MEMBERS AS A PERCENT OF PERSONS IN EACH TECHNICAL OCCUPATION GROUP, BY INDUSTRY DIVISION

Technical occupation group	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services [a]	Private colleges and schools	Government	All other
All technical occupations	17.4	22.3	12.4	73.6	3.7	0.7	0.0	0.2	4.9
Draftsmen	11.3	13.5	20.6	78.9	0.0	0.6	0.0	0.1	0.1
Structural design technicians and related specialists	3.3	1.2	1.8	89.2	—	0.1	0.0	0.0	0.0
Electro and mechanical engineering technicians	32.6	28.1	0.0	74.9	0.0	1.5	0.0	0.3	8.4
Field:									
Electronic	28.0	31.9	0.0	91.0	0.0	2.7	0.0	0.0	22.4
Electrical	42.0	40.8	—	61.1	—	0.0	0.0	0.5	31.9
Mechanical	19.1	18.2	0.0	93.2	0.0	2.5	0.0	1.4	16.2
Electro-mechanical	38.3	26.2	—	82.8	0.0	0.0	0.0	0.0	3.1
Function:									
Design	13.5	12.9	0.0	93.8	—	0.0	0.0	0.0	0.0
Development	21.4	25.2	0.0	60.5	0.0	3.1	0.0	0.0	0.0
Troubleshooting	45.0	41.6	0.0	75.1	0.0	0.0	0.0	0.5	10.4
Mathematics technicians	23.5	31.4	—	—	0.0	0.0	0.0	0.0	—
Physical science technicians	10.3	11.8	0.0	71.2	0.0	1.1	0.0	4.5	2.8
Biological, medical, dental, and related science technicians	3.0	32.0	—	16.7	3.7	0.0	0.0	0.0	0.2
Industrial engineering technicians and related specialists	7.2	9.3	—	8.3	—	0.8	0.0	0.0	0.0
Civil engineering and construction technicians and specialists	9.5	13.8	11.9	83.3	—	0.9	0.0	0.0	0.0
Sales and service technicians	1.4	2.7	0.0	—	0.0	0.0	—	0.0	0.6
Technical writing and illustration specialists	3.7	5.0	—	0.0	—	0.0	0.0	0.0	0.0
Safety and sanitation inspectors and related specialists	0.2	1.9	0.0	26.7	0.0	0.0	0.0	0.0	0.0
Product testing and inspection specialists	41.5	48.2	0.0	39.0	—	0.0	—	0.0	8.2
Data-processing systems analysis and programming specialists	0.8	1.5	0.0	1.5	0.0	0.0	0.0	0.0	0.3
Airway tower specialists and flight dispatchers	15.1	0.0	—	91.2	—	—	—	0.0	—
Broadcasting, motion picture, and recording studio specialists	76.6	79.3	—	82.1	—	—	0.0	0.0	61.1

[a] Includes architectural as well as engineering service enterprises; research, development, and testing laboratories; and business and management consulting services.

Table 24. NUMBER OF VACANCIES REPORTED IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

(Including percent distribution by occupation, and also vacancy rate)

Technical occupation	All industries			Number of vacancies in—							
	Number of vacancies	Percent distribution	Vacancy rate[a]	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[b]	Private colleges and schools	Government	All other
All technical occupations	4,562	100.0	3.1	1,398	157	209	590	526	14	1,150	518
I. Draftsmen	672	14.7	3.2	256	22	7	—	245	1	120	21
A. Architectural and structural	227	5.0	3.6	17	2	1	—	160	—	37	10
1. Construction	218	4.8	3.6	11	2	1	—	157	—	37	10
a. Architectural	130	2.9	3.7	8	—	—	—	113	—	3	6
b. Structural	78	1.7	4.0	3	2	—	—	43	—	28	2
c. Combination: architectural and structural	10	0.2	2.0	—	—	1	—	1	—	6	2
2. Aircraft structures	—	—	0.0	—	—	—	—	—	—	—	—
3. Ship structures	9	0.2	4.2	6	—	—	—	3	—	—	—
B. Electrical-electronic	64	1.4	2.8	44	1	2	—	3	—	14	—
1. Construction	5	0.1	0.7	—	1	2	—	1	—	1	—
2. Other	59	1.3	3.6	44	—	—	—	2	—	13	—
C. Mechanical	210	4.6	3.2	150	15	1	—	34	1	5	4
1. Construction	29	0.6	2.8	—	15	1	—	11	—	2	—
2. Other	181	4.0	3.3	150	—	—	—	23	1	3	4
D. Electro-mechanical	78	1.7	2.1	36	4	2	—	31	—	—	5
1. Construction	11	0.2	5.2	—	4	2	—	5	—	—	—
2. Other	67	1.5	1.9	36	—	—	—	26	—	—	5
E. Highway, street, and related construction	43	0.9	15.9	—	—	—	—	—	—	43	—
F. Map, topographical, and geological	18	0.4	3.0	8	—	1	—	3	—	5	1
G. Plant layout	4	0.1	0.9	1	—	—	—	—	—	2	1
H. General draftsmen	27	0.6	4.1	—	—	—	—	14	—	13	—
I. Draftsmen n.e.c.	1	*	0.7	—	—	—	—	—	—	1	—
II. Structural design technicians and related specialists	46	1.0	1.8	1	—	2	—	35	—	8	—
A. Construction	45	1.0	2.2	—	—	2	—	35	—	8	—
1. Architectural	19	0.4	5.4	—	—	—	—	14	—	5	—
2. Structural	3	0.1	0.9	—	—	2	—	1	—	—	—
3. Combination: architectural and structural	—	—	0.0	—	—	—	—	—	—	—	—
4. Electrical	11	0.2	5.9	—	—	—	—	11	—	—	—
5. Mechanical	2	*	0.4	—	—	—	—	2	—	—	—
6. Combination: electrical and mechanical	7	0.2	4.3	—	—	—	—	7	—	—	—
7. Highway, street, and related construction n.e.c.	—	—	0.0	—	—	—	—	—	—	—	—
8. General construction	3	0.1	0.8	—	—	—	—	—	—	3	—
B. Aircraft structure	1	*	0.3	1	—	—	—	—	—	—	—
1. Design	—	—	0.0	—	—	—	—	—	—	—	—
2. Lofting	1	*	0.6	1	—	—	—	—	—	—	—
C. Ship structure	—	—	0.0	—	—	—	—	—	—	—	—
1. Design	—	—	0.0	—	—	—	—	—	—	—	—
2. Lofting	—	—	0.0	—	—	—	—	—	—	—	—

Continued

Table 24. NUMBER OF VACANCIES REPORTED IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

(Including percent distribution by occupation, and also vacancy rate)

Technical occupation	All industries			Number of vacancies in—							
	Number of vacancies	Percent distribution	Vacancy rate[a]	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[b]	Private colleges and schools	Government	All other
III. Electro and mechanical engineering technicians	1,411	31.0	3.4	738	—	158	2	112	1	25	375
A. Field	1,411	31.0	3.4	738	—	158	2	112	1	25	375
1. Electronic	505	11.1	4.7	450	—	—	—	37	1	1	16
2. Electrical	52	1.1	1.4	37	—	4	—	1	—	10	—
3. Electronic-electrical	88	1.9	1.7	32	—	35	—	8	—	13	—
4. Mechanical	213	4.7	2.5	159	—	5	2	29	—	1	17
5. Electro-mechanical	553	12.2	4.0	60	—	114	—	37	—	—	342
B. Function	1,411	31.0	3.4	738	—	158	2	112	1	25	375
1. Design	168	3.7	2.2	111	—	6	—	48	—	—	3
2. Development	359	7.9	3.0	271	—	3	2	54	—	11	18
3. Troubleshooting and related functions	884	19.4	3.9	356	—	149	—	10	1	14	354
IV. Mathematics technicians	2	*	0.2	1	—	—	—	1	—	—	—
V. Physical science technicians	111	2.4	1.2	77	—	3	—	—	4	13	14
A. Chemical and related	82	1.9	1.6	63	—	3	—	—	4	2	10
1. Pharmaceuticals	8	0.2	2.2	8	—	—	—	—	—	—	—
2. Fuels	—	—	0.0	—	—	—	—	—	—	—	—
3. Beverages and other food products	7	0.2	1.5	7	—	—	—	—	—	—	—
4. Industrial and other chemicals	67	1.5	1.7	48	—	3	—	—	4	2	10
B. Metallurgical and related	1	*	0.1	1	—	—	—	—	—	—	—
C. Physics-chemical	10	0.2	0.6	9	—	—	—	—	—	1	—
D. Physics, radiation, and nuclear	9	0.2	1.2	4	—	—	—	—	—	1	4
E. Meteorology	6	0.1	3.2	—	—	—	—	—	—	6	—
F. Minerals and soil	2	*	1.4	—	—	—	—	—	—	2	—
G. Other	1	*	1.0	—	—	—	—	—	—	1	—
VI. Biological, medical, dental, and related science technicians	1,037	22.7	4.1	9	—	—	588	4	8	407	21
A. Agricultural and related	8	0.2	2.4	3	—	—	—	—	4	1	—
B. Biological and medical laboratory	383	8.3	3.9	6	—	—	263	4	4	96	10
1. Bacteriology (microbiology)	33	0.7	4.5	2	—	—	23	—	—	8	—
2. Biochemistry	38	0.8	4.5	2	—	—	31	—	—	5	—
3. Tissue (histology)	10	0.2	2.3	—	—	—	7	—	—	3	—
4. Cytology	14	0.3	11.5	—	—	—	14	—	—	—	—
5. Hematology	18	0.4	2.9	—	—	—	16	—	—	2	—
6. Blood bank	14	0.3	3.7	—	—	—	13	—	—	1	—
7. Serology	4	0.1	3.8	—	—	—	2	—	—	2	—
8. General and other	252	5.5	3.8	2	—	—	157	4	4	75	10
C. General medical assistants, doctor's office (other than nurse or secretary)	—	—	0.0	—	—	—	—	—	—	—	—
D. X-ray and related equipment technicians	76	1.7	2.5	—	—	—	40	—	—	36	—
E. Other medical technicians	53	1.2	2.9	—	—	—	40	—	—	13	—
1. Electrocardiograph	9	0.2	1.6	—	—	—	6	—	—	3	—
2. Electroencephalograph	6	0.1	3.8	—	—	—	3	—	—	3	—

Continued

Table 24. NUMBER OF VACANCIES REPORTED IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

(Including percent distribution by occupation, and also vacancy rate)

Technical occupation	All industries			Number of vacancies in—							
	Number of vacancies	Percent distribution	Vacancy rate[a]	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[b]	Private colleges and schools	Government	All other
VI. Biological, medical, dental, and related science technicians (continued)											
3. Inhalation therapy	7	0.2	4.6	—	—	—	6	—	—	1	—
4. Other	31	0.7	3.3	—	—	—	25	—	—	6	—
F. Therapists	264	5.7	14.0	—	—	—	37	—	—	216	11
1. Physical	133	2.9	13.3	—	—	—	24	—	—	103	6
2. Occupational, recreational, and other	131	2.8	14.9	—	—	—	13	—	—	113	5
G. Medical record librarians	16	0.4	4.6	—	—	—	8	—	—	8	—
H. Dental laboratory technicians	132	2.9	4.6	—	—	—	132	—	—	—	—
1. Ceramists	10	0.2	4.6	—	—	—	10	—	—	—	—
2. Dental mechanics	122	2.7	4.6	—	—	—	122	—	—	—	—
I. Dental hygienists	47	1.0	2.5	—	—	—	18	—	—	29	—
J. Dental assistants	58	1.3	2.5	—	—	—	50	—	—	8	—
VII. Industrial engineering technicians and related specialists	94	2.1	1.4	77	—	2	—	3	—	12	—
A. Industrial engineering technicians	34	0.8	1.5	34	—	—	—	—	—	—	—
1. Time and motion study men and standards setters	20	0.5	1.8	20	—	—	—	—	—	—	—
2. Industrial process methods men	12	0.3	1.5	12	—	—	—	—	—	—	—
3. General	2	[c]	0.7	2	—	—	—	—	—	—	—
B. Quality control and reliability technicians	13	0.3	1.0	6	—	—	—	—	—	7	—
C. Production planners, estimators, and related specialists	41	0.9	1.4	36	—	2	—	3	—	—	—
1. Production planners	10	0.2	1.0	10	—	—	—	—	—	—	—
2. Production cost estimators	12	0.3	3.0	12	—	—	—	—	—	—	—
3. Production schedulers, coordinators, and expediters	5	0.1	1.0	3	—	2	—	—	—	—	—
4. Parts, equipment, and materials estimators, standardizers, coordinators, and catalogers	6	0.1	1.0	3	—	—	—	3	—	—	—
5. General	8	0.2	2.0	8	—	—	—	—	—	—	—
D. Equipment specialists	6	0.1	1.3	1	—	—	—	—	—	5	—
1. Electro equipment and systems	—	—	0.0	—	—	—	—	—	—	—	—
2. Industrial machinery, equipment, and tools	1	[c]	2.6	1	—	—	—	—	—	—	—
3. Ship and marine equipment	—	—	0.0	—	—	—	—	—	—	—	—
4. Aircraft, missiles, and automotive equipment	—	—	0.0	—	—	—	—	—	—	—	—
5. Ordnance	—	—	0.0	—	—	—	—	—	—	—	—
6. General and other	5	0.1	2.7	—	—	—	—	—	—	5	—
VIII. Civil engineering and construction technicians and specialists	574	12.6	4.3	1	135	4	—	53	—	371	10
A. Surveyors and related specialists	34	0.7	1.4	—	—	2	—	29	—	3	—
1. Surveyors	15	0.3	1.3	—	—	—	—	15	—	—	—
2. Instrumentmen	10	0.2	1.0	—	—	—	—	9	—	1	—
3. General and other	9	0.2	4.4	—	—	2	—	5	—	2	—

Continued

Table 24. NUMBER OF VACANCIES REPORTED IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

(Including percent distribution by occupation, and also vacancy rate)

Technical occupation	All industries			Number of vacancies in—							
	Number of vacancies	Percent distribution	Vacancy rate[a]	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[b]	Private colleges and schools	Government	All other
VIII. Civil engineering and construction technicians and specialists (continued)											
B. Civil engineering and construction technicians	277	6.1	5.6	—	1	2	—	11	—	263	—
1. Buildings	32	0.7	1.8	—	1	—	—	9	—	22	—
2. Highway, street, and other heavy construction	5	0.1	0.5	—	—	2	—	—	—	3	—
3. General and other	240	5.3	11.0	—	—	—	—	2	—	238	—
C. Construction inspectors	112	2.5	4.0	—	—	—	—	9	—	103	—
1. Building structures	36	0.8	3.2	—	—	—	—	5	—	31	—
2. Electrical and mechanical equipment	45	1.0	9.0	—	—	—	—	—	—	45	—
3. Plumbing	3	0.1	1.4	—	—	—	—	—	—	3	—
4. Heating, air conditioning, and related equipment	1	[c]	1.9	—	—	—	—	—	—	1	—
5. General and other	27	0.6	3.0	—	—	—	—	4	—	23	—
D. Construction specification writers and cost estimators	151	3.3	4.5	1	134	—	—	4	—	2	10
1. Specification writers	1	[c]	0.9	—	—	—	—	1	—	—	—
a. Architectural and structural	1	[c]	1.4	—	—	—	—	1	—	—	—
b. Mechanical and electrical	—	—	0.0	—	—	—	—	—	—	—	—
c. Highway, street, and related construction	—	—	0.0	—	—	—	—	—	—	—	—
2. Cost estimators	150	3.3	5.2	1	134	—	—	3	—	2	10
a. Architectural and structural	60	1.3	4.2	1	57	—	—	1	—	1	—
b. Mechanical and electrical	49	1.1	5.8	—	49	—	—	—	—	—	—
c. Highway, street, and related construction	21	0.5	5.8	—	21	—	—	—	—	—	—
d. General	20	0.4	7.4	—	7	—	—	2	—	1	10
3. Combination: specification writers and cost estimators	—	—	0.0	—	—	—	—	—	—	—	—
a. Architectural and structural	—	—	0.0	—	—	—	—	—	—	—	—
b. Mechanical and electrical	—	—	0.0	—	—	—	—	—	—	—	—
c. Highway, street, and related construction	—	—	0.0	—	—	—	—	—	—	—	—
d. General and other	—	—	0.0	—	—	—	—	—	—	—	—
IX. Sales and service technicians	27	0.6	1.4	27	—	—	—	—	—	—	—
X. Technical writing and illustration specialists	117	2.6	3.9	72	—	—	—	44	—	1	—
A. Technical writers and related specialists	85	1.9	4.5	54	—	—	—	30	—	1	—
1. Technical writers and editors	70	1.6	4.2	42	—	—	—	28	—	—	—
2. Specifications writers, other than construction	15	0.3	6.3	12	—	—	—	2	—	1	—
B. Technical illustrators	32	0.7	3.0	18	—	—	—	14	—	—	—
C. General and other	—	—	0.0	—	—	—	—	—	—	—	—
XI. Safety and sanitation inspectors and related specialists	154	3.4	3.8	1	—	—	—	—	—	143	10
A. Industrial safety and fire prevention	110	2.4	4.9	1	—	—	—	—	—	99	10
B. Sanitation	44	1.0	2.5	—	—	—	—	—	—	44	—
C. Air safety	—	—	0.0	—	—	—	—	—	—	—	—

Continued

Table 24. NUMBER OF VACANCIES REPORTED IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

(Including percent distribution by occupation, and also vacancy rate)

Technical occupation	All industries			Number of vacancies in—							
	Number of vacancies	Percent distribution	Vacancy rate[a]	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[b]	Private colleges and schools	Government	All other
XII. Product testing and inspection specialists	115	2.5	1.4	75	—	—	—	19	—	15	6
A. Instruments, meters, and related equipment	13	0.3	0.6	4	—	—	—	3	—	6	—
1. Testing, measuring, and control instruments	7	0.2	0.4	4	—	—	—	3	—	—	—
a. Electronic-electrical	3	0.1	0.2	3	—	—	—	—	—	—	—
b. General and other n.e.c.	4	0.1	1.3	1	—	—	—	3	—	—	—
2. Optical and photographic	—	—	0.0	—	—	—	—	—	—	—	—
3. Water, electric, and gas meters	4	0.1	6.3	—	—	—	—	—	—	4	—
4. Weights and measures	2	[c]	1.2	—	—	—	—	—	—	2	—
B. Machinery, transportation and other metal equipment, and appliances n.e.c.	21	0.5	0.8	19	—	—	—	—	—	2	—
1. Industrial machinery and equipment	8	0.2	1.1	8	—	—	—	—	—	—	—
a. Electronic-electrical	4	0.1	1.1	4	—	—	—	—	—	—	—
b. General and other n.e.c.	4	0.1	1.0	4	—	—	—	—	—	—	—
2. Aircraft equipment	—	—	0.0	—	—	—	—	—	—	—	—
3. Automotive equipment	6	0.2	3.9	6	—	—	—	—	—	—	—
4. Office equipment	—	—	0.0	—	—	—	—	—	—	—	—
5. Household appliances	2	[c]	1.8	2	—	—	—	—	—	—	—
6. Military equipment	—	—	0.0	—	—	—	—	—	—	—	—
7. Metal castings, machined parts, and related materials	5	0.1	1.0	3	—	—	—	—	—	2	—
C. Chemical and other nonmetal products n.e.c.	61	1.3	3.2	48	—	—	—	—	—	7	6
1. Chemical and related products	46	1.0	5.4	40	—	—	—	—	—	—	6
a. Chemical and petroleum	33	0.7	8.8	27	—	—	—	—	—	—	6
b. Other	13	0.3	2.8	13	—	—	—	—	—	—	—
2. Construction materials	9	0.2	4.2	4	—	—	—	—	—	5	—
3. Paper and related products	—	—	0.0	—	—	—	—	—	—	—	—
a. Paper and pulp	—	—	0.0	—	—	—	—	—	—	—	—
b. Wood and other	—	—	0.0	—	—	—	—	—	—	—	—
4. Rubber and plastic products	1	[c]	0.6	1	—	—	—	—	—	—	—
5. Textiles and related products	—	—	0.0	—	—	—	—	—	—	—	—
a. Cloth	—	—	0.0	—	—	—	—	—	—	—	—
b. Other	—	—	0.0	—	—	—	—	—	—	—	—
6. Other	5	0.1	7.2	3	—	—	—	—	—	2	—
D. Food and agricultural products	2	[c]	0.4	2	—	—	—	—	—	—	—
1. Milk and milk products	—	—	0.0	—	—	—	—	—	—	—	—
2. General and other	2	[c]	0.8	2	—	—	—	—	—	—	—
E. Industrial X-ray and related processes	16	0.4	5.2	—	—	—	—	16	—	—	—
1. Industrial X-ray and radiography	16	0.4	7.2	—	—	—	—	16	—	—	—
2. General and other	—	—	0.0	—	—	—	—	—	—	—	—
F. General and other	2	[c]	1.2	2	—	—	—	—	—	—	—

Continued

Table 24. NUMBER OF VACANCIES REPORTED IN EACH DETAILED TECHNICAL OCCUPATION, BY INDUSTRY DIVISION

(Including percent distribution by occupation, and also vacancy rate)

Technical occupation	All industries			Number of vacancies in—							
	Number of vacancies	Percent distribution	Vacancy rate[a]	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[b]	Private colleges and schools	Government	All other
XIII. Data-processing systems analysis and programming specialists	192	4.2	3.1	63	—	31	—	10	—	27	61
A. Systems analysts	41	0.9	2.2	16	—	—	—	1	—	4	20
B. Programmers	139	3.0	4.3	45	—	31	—	8	—	23	32
1. Business and accounting	93	2.0	4.0	26	—	31	—	1	—	3	32
2. Engineering and scientific	17	0.4	3.1	10	—	—	—	7	—	—	—
3. Combination: business and engineering	29	0.6	8.3	9	—	—	—	—	—	20	—
C. Combination: systems analysis and programming	9	0.2	1.0	2	—	—	—	—	—	—	7
D. Project planners	3	0.1	2.2	—	—	—	—	1	—	—	2
XIV. Airway tower specialists and flight dispatchers	—	—	0.0	—	—	—	—	—	—	—	—
A. Airway tower specialists	—	—	0.0	—	—	—	—	—	—	—	—
B. Flight dispatchers	—	—	0.0	—	—	—	—	—	—	—	—
XV. Broadcasting, motion picture, and recording studio specialists	10	0.2	0.3	—	—	2	—	—	—	8	—
A. Studio technicians	1	[c]	0.1	—	—	—	—	—	—	1	—
1. Technical directors	—	—	0.0	—	—	—	—	—	—	—	—
2. Light	1	[c]	1.1	—	—	—	—	—	—	1	—
3. Audio and acoustics	—	—	0.0	—	—	—	—	—	—	—	—
4. Sound effects	—	—	0.0	—	—	—	—	—	—	—	—
5. Video control	—	—	0.0	—	—	—	—	—	—	—	—
6. Recording	—	—	0.0	—	—	—	—	—	—	—	—
7. Studio field	—	—	0.0	—	—	—	—	—	—	—	—
8. General	—	—	0.0	—	—	—	—	—	—	—	—
B. Video tape and kinescope technicians	—	—	0.0	—	—	—	—	—	—	—	—
C. Equipment and maintenance technicians	9	0.2	0.7	—	—	2	—	—	—	7	—
1. Transmitter	7	0.2	1.6	—	—	—	—	—	—	7	—
2. Transmission	—	—	0.0	—	—	—	—	—	—	—	—
3. Maintenance	—	—	0.0	—	—	—	—	—	—	—	—
4. General	2	[c]	0.6	—	—	2	—	—	—	—	—

[a] Number of vacancies divided by total number of persons in technical occupation (see table 9).
[b] Includes architectural as well as engineering service enterprises; research, development, and testing laboratories; and business and management consulting services.
[c] Less than 0.05 of a percent.

Table 25. VACANCY RATE[a] IN EACH TECHNICAL OCCUPATION GROUP, BY INDUSTRY DIVISION

Technical occupation group	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[b]	Private colleges and schools	Government	All other
All technical occupations	3.1	2.4	2.1	1.5	3.6	3.6	0.4	5.5	4.3
Draftsmen	3.2	2.7	1.9	0.7	0.0	3.5	1.5	11.2	1.6
Structural design technicians and related specialists	1.8	0.2	0.0	2.4	—	2.6	0.0	6.3	0.0
Electro and mechanical engineering technicians	3.4	3.1	0.0	1.8	15.4	5.2	0.2	1.0	9.2
Mathematics technicians	0.2	0.2	—	—	0.0	0.7	0.0	0.0	—
Physical science technicians	1.2	1.1	0.0	2.4	0.0	0.0	0.6	2.3	4.4
Biological, medical, dental, and related science technicians	4.1	1.8	—	0.0	3.6	5.3	0.4	7.6	2.5
Industrial engineering technicians and related specialists	1.4	1.5	—	1.7	—	1.2	0.0	1.0	0.0
Civil engineering and construction technicians and specialists	4.3	0.8	2.3	0.6	—	2.5	0.0	8.0	6.7
Sales and service technicians	1.4	3.3	0.0	—	0.0	0.0	—	0.0	0.0
Technical writing and illustration specialists	3.9	3.3	—	0.0	—	7.2	0.0	1.3	0.0
Safety and sanitation inspectors and related specialists	3.8	0.4	0.0	0.0	0.0	0.0	0.0	4.4	1.9
Product testing and inspection specialists	1.4	1.1	0.0	0.0	—	5.6	0.0	2.4	3.8
Data-processing systems analysis and programming specialists	3.1	3.1	0.0	6.7	0.0	4.6	0.0	6.6	2.1
Airway tower specialists and flight dispatchers	0.0	0.0	—	0.0	—	—	—	0.0	—
Broadcasting, motion picture, and recording studio specialists	0.3	0.0	—	0.1	—	—	0.0	8.2	0.0

[a] Number of vacancies, from table 24, divided by total number of persons in each technical occupation (see table 9).

[b] Includes architectural as well as engineering service enterprises; research, development, and testing laboratories; and business and management consulting services.

Table 26. NUMBER OF VACANCIES REPORTED IN EACH TECHNICAL OCCUPATION, BY AREA

Technical occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
All technical occupations	4,562	1,843	881	159	211	164	330	190	129	87	568
I. Draftsmen	672	267	108	5	69	17	38	32	43	12	81
A. Architectural and structural	227	144	22	3	14	2	10	2	6	3	21
1. Construction	218	135	22	3	14	2	10	2	6	3	21
a. Architectural	130	69	12	2	8	2	10	2	1	3	21
b. Structural	78	62	10	—	2	—	—	—	4	—	—
c. Combination: architectural and structural	10	4	—	1	4	—	—	—	1	—	—
2. Aircraft structures	—	—	—	—	—	—	—	—	—	—	—
3. Ship structures	9	9	—	—	—	—	—	—	—	—	—
B. Electrical-electronic	64	23	21	—	1	—	3	1	12	—	3
1. Construction	5	3	—	—	1	—	—	—	1	—	—
2. Other	59	20	21	—	—	—	3	1	11	—	3
C. Mechanical	210	67	24	1	9	—	21	20	19	3	46
1. Construction	29	18	—	—	2	—	5	—	4	—	—
2. Other	181	49	24	1	7	—	16	20	15	3	46
D. Electro-mechanical	78	9	35	—	2	3	—	8	4	6	11
1. Construction	11	4	5	—	—	—	—	—	2	—	—
2. Other	67	5	30	—	2	3	—	8	2	6	11
E. Highway, street, and related construction	43	—	—	—	43	—	—	—	—	—	—
F. Map, topographical, and geological	18	10	1	1	—	3	2	—	1	—	—
G. Plant layout	4	3	—	—	—	—	1	—	—	—	—
H. General draftsmen	27	11	5	—	—	9	1	1	—	—	—
I. Draftsmen n.e.c.	1	—	—	—	—	—	—	—	1	—	—
II. Structural design technicians and related specialists	46	34	10	1	—	—	—	—	1	—	—
A. Construction	45	34	9	1	—	—	—	—	1	—	—
1. Architectural	19	16	2	1	—	—	—	—	—	—	—
2. Structural	3	3	—	—	—	—	—	—	—	—	—
3. Combination: architectural and structural	—	—	—	—	—	—	—	—	—	—	—
4. Electrical	11	11	—	—	—	—	—	—	—	—	—
5. Mechanical	2	—	2	—	—	—	—	—	—	—	—
6. Combination: electrical and mechanical	7	1	5	—	—	—	—	—	1	—	—
7. Highway, street, and related construction n.e.c.	—	—	—	—	—	—	—	—	—	—	—
8. General construction	3	3	—	—	—	—	—	—	—	—	—
B. Aircraft structure	1	—	1	—	—	—	—	—	—	—	—
1. Design	—	—	—	—	—	—	—	—	—	—	—
2. Lofting	1	—	1	—	—	—	—	—	—	—	—
C. Ship structure	—	—	—	—	—	—	—	—	—	—	—
1. Design	—	—	—	—	—	—	—	—	—	—	—
2. Lofting	—	—	—	—	—	—	—	—	—	—	—

Continued

Table 26. NUMBER OF VACANCIES REPORTED IN EACH TECHNICAL OCCUPATION, BY AREA

Technical occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
III. Electro and mechanical engineering technicians	1,411	378	507	44	38	64	72	65	18	22	203
A. Field	1,411	378	507	44	38	64	72	65	18	22	203
1. Electronic	505	19	363	27	10	26	5	—	—	6	49
2. Electrical	52	16	10	—	—	3	12	4	—	—	7
3. Electronic-electrical	88	57	3	1	—	3	2	2	2	1	17
4. Mechanical	213	51	55	—	—	13	8	38	1	3	44
5. Electro-mechanical	553	235	76	16	28	19	45	21	15	12	86
B. Function	1,411	378	507	44	38	64	72	65	18	22	203
1. Design	168	46	33	—	4	13	4	29	1	7	31
2. Development	359	36	163	18	2	32	9	17	—	1	81
3. Troubleshooting	884	296	311	26	32	19	59	19	17	14	91
IV. Mathematics technicians	2	—	1	—	—	—	1	—	—	—	—
V. Physical science technicians	111	16	18	18	1	5	14	7	10	1	21
A. Chemical and related	82	9	14	18	—	2	10	2	10	—	17
1. Pharmaceuticals	8	—	—	4	—	—	—	—	—	—	4
2. Fuels	—	—	—	—	—	—	—	—	—	—	—
3. Beverages and other food products	7	—	—	2	—	—	—	1	—	—	4
4. Industrial and other chemicals	67	9	14	12	—	2	10	1	10	—	9
B. Metallurgical and related	1	1	—	—	—	—	—	—	—	—	—
C. Physics-chemical	10	—	—	—	1	3	2	1	—	—	3
D. Physics, radiation, and nuclear	9	1	4	—	—	—	—	4	—	—	—
E. Meteorology	6	4	—	—	—	—	2	—	—	—	—
F. Minerals and soil	2	—	—	—	—	—	—	—	—	1	1
G. Other	1	1	—	—	—	—	—	—	—	—	—
VI. Biological, medical, dental, and related science technicians	1,037	553	112	32	37	10	107	14	16	30	126
A. Agricultural and related	8	1	—	—	—	—	3	—	—	—	4
B. Biological and medical laboratory	383	176	30	19	18	2	57	8	11	13	49
1. Bacteriology (microbiology)	33	18	4	2	—	—	7	—	1	—	1
2. Biochemistry	38	27	—	1	1	—	6	—	—	—	3
3. Tissue (histology)	10	6	—	1	—	—	2	—	—	—	1
4. Cytology	14	14	—	—	—	—	—	—	—	—	—
5. Hematology	18	4	—	—	—	—	5	5	—	—	4
6. Blood bank	14	6	1	3	1	—	3	—	—	—	—
7. Serology	4	—	2	—	—	—	2	—	—	—	—
8. General and other	252	101	23	12	16	2	32	3	10	13	40
C. General medical assistants, doctor's office (other than nurse or secretary)	—	—	—	—	—	—	—	—	—	—	—
D. X-ray and related equipment technicians	76	41	2	3	—	7	6	—	1	2	14
E. Other medical technicians	53	29	—	—	—	—	17	2	—	—	5
1. Electrocardiograph	9	7	—	—	—	—	2	—	—	—	—
2. Electroencephalograph	6	4	—	—	—	—	2	—	—	—	—

Continued

Table 26. NUMBER OF VACANCIES REPORTED IN EACH TECHNICAL OCCUPATION, BY AREA

Technical occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
VI. Biological, medical, dental, and related science technicians (continued)											
3. Inhalation therapy	7	5	—	—	—	—	1	—	—	—	1
4. Other	31	13	—	—	—	—	12	2	—	—	4
F. Therapists	264	176	20	10	5	1	18	2	—	6	26
1. Physical	133	78	10	2	3	—	12	1	—	5	22
2. Occupational, recreational, and other	131	98	10	8	2	1	6	1	—	1	4
G. Medical record librarians	16	7	2	—	1	—	4	—	—	—	2
H. Dental laboratory technicians	132	102	3	—	11	—	2	2	3	7	2
1. Ceramists	10	8	—	—	—	—	—	—	—	2	—
2. Dental mechanics	122	94	3	—	11	—	2	2	3	5	2
I. Dental hygienists	47	13	5	—	2	—	—	—	1	2	24
J. Dental assistants	58	8	50	—	—	—	—	—	—	—	—
VII. Industrial engineering technicians and related specialists	94	29	10	—	—	3	2	19	5	2	24
A. Industrial engineering technicians	34	9	2	—	—	3	—	5	2	1	12
1. Time and motion study men and standards setters	20	—	2	—	—	2	—	4	2	—	10
2. Industrial process methods men	12	7	—	—	—	1	—	1	—	1	2
3. General	2	2	—	—	—	—	—	—	—	—	—
B. Quality control and reliability technicians	13	4	2	—	—	—	1	3	2	—	1
C. Production planners, estimators, and related specialists	41	14	5	—	—	—	—	11	1	—	10
1. Production planners	10	—	4	—	—	—	—	—	—	—	6
2. Production cost estimators	12	9	1	—	—	—	—	—	1	—	1
3. Production schedulers, coordinators, and expediters	5	2	—	—	—	—	—	3	—	—	—
4. Parts, equipment, and materials estimators, standardizers, coordinators, and catalogers	6	3	—	—	—	—	—	—	—	—	3
5. General	8	—	—	—	—	—	—	8	—	—	—
D. Equipment specialists	6	2	1	—	—	—	1	—	—	1	1
1. Electro equipment and systems	—	—	—	—	—	—	—	—	—	—	—
2. Industrial machinery, equipment, and tools	1	—	—	—	—	—	—	—	—	—	1
3. Ship and marine equipment	—	—	—	—	—	—	—	—	—	—	—
4. Aircraft, missiles, and automotive equipment	—	—	—	—	—	—	—	—	—	—	—
5. Ordnance	—	—	—	—	—	—	—	—	—	—	—
6. General and other	5	2	1	—	—	—	1	—	—	1	—
VIII. Civil engineering and construction technicians and specialists	574	216	70	8	43	41	64	25	25	15	67
A. Surveyors and related specialists	34	10	5	2	1	—	2	—	—	—	14
1. Surveyors	15	4	3	1	—	—	—	—	—	—	7
2. Instrumentmen	10	3	2	—	—	—	1	—	—	—	4
3. General and other	9	3	—	1	1	—	1	—	—	—	3

Continued

Table 26. NUMBER OF VACANCIES REPORTED IN EACH TECHNICAL OCCUPATION, BY AREA

Technical occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
VIII. Civil engineering and construction technicians and specialists (continued)											
B. Civil engineering and construction technicians	277	40	59	4	32	26	17	24	17	15	43
1. Buildings	32	30	—	2	—	—	—	—	—	—	—
2. Highway, street, and other heavy construction	5	5	—	—	—	—	—	—	—	—	—
3. General and other	240	5	59	2	32	26	17	24	17	15	43
C. Construction inspectors	112	98	5	—	2	—	5	1	1	—	—
1. Building structures	36	28	3	—	2	—	2	1	—	—	—
2. Electrical and mechanical equipment	45	44	—	—	—	—	—	—	1	—	—
3. Plumbing	3	2	—	—	—	—	1	—	—	—	—
4. Heating, air conditioning, and related equipment	1	1	—	—	—	—	—	—	—	—	—
5. General and other	27	23	2	—	—	—	2	—	—	—	—
D. Construction specification writers and cost estimators	151	68	1	2	8	15	40	—	7	—	10
1. Specification writers	1	1	—	—	—	—	—	—	—	—	—
a. Architectural and structural	1	1	—	—	—	—	—	—	—	—	—
b. Mechanical and electrical	—	—	—	—	—	—	—	—	—	—	—
c. Highway, street, and related construction	—	—	—	—	—	—	—	—	—	—	—
2. Cost estimators	150	67	1	2	8	15	40	—	7	—	10
a. Architectural and structural	60	11	1	—	1	—	40	—	7	—	—
b. Mechanical and electrical	49	47	—	2	—	—	—	—	—	—	—
c. Highway, street, and related construction	21	6	—	—	—	15	—	—	—	—	—
d. General	20	3	—	—	7	—	—	—	—	—	10
3. Combination: specification writers and cost estimators	—	—	—	—	—	—	—	—	—	—	—
a. Architectural and structural	—	—	—	—	—	—	—	—	—	—	—
b. Mechanical and electrical	—	—	—	—	—	—	—	—	—	—	—
c. Highway, street, and related construction	—	—	—	—	—	—	—	—	—	—	—
d. General and other	—	—	—	—	—	—	—	—	—	—	—
IX. Sales and service technicians	27	1	—	15	—	1	3	3	—	—	4
X. Technical writing and illustration specialists	117	44	22	1	3	22	12	6	2	—	5
A. Technical writers and related specialists	85	28	20	1	2	16	7	5	2	—	4
1. Technical writers and editors	70	14	20	1	1	16	7	5	2	—	4
2. Specifications writers, other than construction	15	14	—	—	1	—	—	—	—	—	—
B. Technical illustrators	32	16	2	—	1	6	5	1	—	—	1
C. General and other	—	—	—	—	—	—	—	—	—	—	—
XI. Safety and sanitation inspectors and related specialists	154	131	1	2	5	1	4	4	1	1	4
A. Industrial safety and fire prevention	110	97	—	—	1	1	4	4	1	1	1
B. Sanitation	44	34	1	2	4	—	—	—	—	—	3
C. Air safety	—	—	—	—	—	—	—	—	—	—	—

Continued

Table 26. NUMBER OF VACANCIES REPORTED IN EACH TECHNICAL OCCUPATION, BY AREA

Technical occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
XII. Product testing and inspection specialists	115	39	10	29	6	—	10	1	1	1	18
A. Instruments, meters, and related equipment	13	2	2	1	2	—	4	—	—	1	1
1. Testing, measuring, and control instruments	7	—	2	1	—	—	3	—	—	1	—
a. Electronic-electrical	3	—	2	1	—	—	—	—	—	—	—
b. General and other n.e.c.	4	—	—	—	—	—	3	—	—	1	—
2. Optical and photographic	—	—	—	—	—	—	—	—	—	—	—
3. Water, electric, and gas meters	4	2	—	—	2	—	—	—	—	—	—
4. Weights and measures	2	—	—	—	—	—	1	—	—	—	1
B. Machinery, transportation and other metal equipment, and appliances n.e.c.	21	2	4	2	—	—	—	—	1	—	12
1. Industrial machinery and equipment	8	—	4	—	—	—	—	—	—	—	4
a. Electronic-electrical	4	—	4	—	—	—	—	—	—	—	—
b. General and other n.e.c.	4	—	—	—	—	—	—	—	—	—	4
2. Aircraft equipment	—	—	—	—	—	—	—	—	—	—	—
3. Automotive equipment	6	—	—	2	—	—	—	—	1	—	3
4. Office equipment	—	—	—	—	—	—	—	—	—	—	—
5. Household appliances	2	—	—	—	—	—	—	—	—	—	2
6. Military equipment	—	—	—	—	—	—	—	—	—	—	—
7. Metal castings, machined parts, and related materials	5	2	—	—	—	—	—	—	—	—	3
C. Chemical and other nonmetal products n.e.c.	61	21	—	25	4	—	6	—	—	—	5
1. Chemical and related products	46	18	—	24	—	—	4	—	—	—	—
a. Chemical and petroleum	33	6	—	24	—	—	3	—	—	—	—
b. Other	13	12	—	—	—	—	1	—	—	—	—
2. Construction materials	9	3	—	—	4	—	2	—	—	—	—
3. Paper and related products	—	—	—	—	—	—	—	—	—	—	—
a. Paper and pulp	—	—	—	—	—	—	—	—	—	—	—
b. Wood and other	—	—	—	—	—	—	—	—	—	—	—
4. Rubber and plastic products	1	—	—	1	—	—	—	—	—	—	—
5. Textiles and related products	—	—	—	—	—	—	—	—	—	—	—
a. Cloth	—	—	—	—	—	—	—	—	—	—	—
b. Other	—	—	—	—	—	—	—	—	—	—	—
6. Other	5	—	—	—	—	—	—	—	—	—	5
D. Food and agricultural products	2	—	—	1	—	—	—	1	—	—	—
1. Milk and milk products	—	—	—	—	—	—	—	—	—	—	—
2. General and other	2	—	—	1	—	—	—	1	—	—	—
E. Industrial X-ray and related processes	16	12	4	—	—	—	—	—	—	—	—
1. Industrial X-ray and radiography	16	12	4	—	—	—	—	—	—	—	—
2. General and other	—	—	—	—	—	—	—	—	—	—	—
F. General and other	2	2	—	—	—	—	—	—	—	—	—

Continued

Table 26. NUMBER OF VACANCIES REPORTED IN EACH TECHNICAL OCCUPATION, BY AREA

Technical occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
XIII. Data-processing systems analysis and programming specialists	192	127	12	4	9	—	3	14	7	3	13
A. Systems analysts	41	30	—	—	2	—	—	8	1	—	—
B. Programmers	139	88	10	4	7	—	3	5	6	3	13
1. Business and accounting	93	69	1	1	—	—	1	—	6	3	12
2. Engineering and scientific	17	3	9	3	—	—	2	—	—	—	—
3. Combination: business and engineering	29	16	—	—	7	—	—	5	—	—	1
C. Combination: systems analysis and programming	9	6	2	—	—	—	—	1	—	—	—
D. Project planners	3	3	—	—	—	—	—	—	—	—	—
XIV. Airway tower specialists and flight dispatchers	—	—	—	—	—	—	—	—	—	—	—
A. Airway tower specialists	—	—	—	—	—	—	—	—	—	—	—
B. Flight dispatchers	—	—	—	—	—	—	—	—	—	—	—
XV. Broadcasting, motion picture, and recording studio specialists	10	8	—	—	—	—	—	—	—	—	2
A. Studio technicians	1	1	—	—	—	—	—	—	—	—	—
1. Technical directors	—	—	—	—	—	—	—	—	—	—	—
2. Light	1	1	—	—	—	—	—	—	—	—	—
3. Audio and acoustics	—	—	—	—	—	—	—	—	—	—	—
4. Sound effects	—	—	—	—	—	—	—	—	—	—	—
5. Video control	—	—	—	—	—	—	—	—	—	—	—
6. Recording	—	—	—	—	—	—	—	—	—	—	—
7. Studio field	—	—	—	—	—	—	—	—	—	—	—
8. General	—	—	—	—	—	—	—	—	—	—	—
B. Video tape and kinescope technicians	—	—	—	—	—	—	—	—	—	—	—
C. Equipment and maintenance technicians	9	7	—	—	—	—	—	—	—	—	2
1. Transmitter	7	7	—	—	—	—	—	—	—	—	—
2. Transmission	—	—	—	—	—	—	—	—	—	—	—
3. Maintenance	—	—	—	—	—	—	—	—	—	—	—
4. General	2	—	—	—	—	—	—	—	—	—	2

Table 27. NUMBER OF VACANCIES REPORTED IN EACH TECHNICAL OCCUPATION, BY GRADE

Technical occupation	All grades	Supervisory grades	Nonsupervisory grades			
			Single grade only	Multi-grade		
				Lowest grades	Middle grades	Highest grades
All technical occupations	4,562	67	2,985	843	241	426
I. Draftsmen	672	5	459	89	43	76
A. Architectural and structural	227	—	163	24	15	25
1. Construction	218	—	154	24	15	25
a. Architectural	130	—	83	22	9	16
b. Structural	78	—	67	2	1	8
c. Combination: architectural and structural	10	—	4	—	5	1
2. Aircraft structures	—	—	—	—	—	—
3. Ship structures	9	—	9	—	—	—
B. Electrical-electronic	64	—	52	4	5	3
1. Construction	5	—	1	1	2	1
2. Other	59	—	51	3	3	2
C. Mechanical	210	4	126	37	17	26
1. Construction	29	—	20	5	1	3
2. Other	181	4	106	32	16	23
D. Electro-mechanical	78	—	46	7	5	20
1. Construction	11	—	4	—	—	7
2. Other	67	—	42	7	5	13
E. Highway, street, and related construction	43	—	37	6	—	—
F. Map, topographical, and geological	18	—	14	2	—	2
G. Plant layout	4	1	3	—	—	—
H. General draftsmen	27	—	18	8	1	—
I. Draftsmen n.e.c.	1	—	—	1	—	—
II. Structural design technicians and related specialists	46	—	23	15	4	4
A. Construction	45	—	22	15	4	4
1. Architectural	19	—	8	8	3	—
2. Structural	3	—	—	1	1	1
3. Combination: architectural and structural	—	—	—	—	—	—
4. Electrical	11	—	11	—	—	—
5. Mechanical	2	—	2	—	—	—
6. Combination: electrical and mechanical	7	—	1	4	—	2
7. Highway, street, and related construction n.e.c.	—	—	—	—	—	—
8. General construction	3	—	—	2	—	1
B. Aircraft structure	1	—	1	—	—	—
1. Design	—	—	—	—	—	—
2. Lofting	1	—	1	—	—	—
C. Ship structure	—	—	—	—	—	—
1. Design	—	—	—	—	—	—
2. Lofting	—	—	—	—	—	—
III. Electro and mechanical engineering technicians	1,411	5	1,156	155	20	75
A. Field	1,411	5	1,156	155	20	75
1. Electronic	505	1	408	56	7	33
2. Electrical	52	1	29	14	5	3
3. Electronic-electrical	88	—	80	4	—	4
4. Mechanical	213	1	156	38	4	14
5. Electro-mechanical	553	2	483	43	4	21
B. Function	1,411	5	1,156	155	20	75
1. Design	168	4	127	26	1	10
2. Development	359	—	239	57	17	46
3. Troubleshooting	884	1	790	72	2	19
IV. Mathematics technicians	2	—	—	2	—	—
V. Physical science technicians	111	4	38	29	21	19
A. Chemical and related	82	—	30	17	18	17
1. Pharmaceuticals	8	—	6	1	—	1
2. Fuels	—	—	—	—	—	—
3. Beverages and other food products	7	—	1	4	—	2
4. Industrial and other chemicals	67	—	23	12	18	14

Continued

Table 27. NUMBER OF VACANCIES REPORTED IN EACH TECHNICAL OCCUPATION, BY GRADE

Technical occupation	All grades	Supervisory grades	Nonsupervisory grades			
			Single grade only	Multi-grade		
				Lowest grades	Middle grades	Highest grades
V. Physical science technicians (continued)						
B. Metallurgical and related	1	—	1	—	—	—
C. Physics-chemical	10	—	5	4	—	1
D. Physics, radiation, and nuclear	9	—	1	7	—	1
E. Meteorology	6	4	—	—	2	—
F. Minerals and soil	2	—	—	1	1	—
G. Other	1	—	1	—	—	—
VI. Biological, medical, dental, and related science technicians	1,037	24	706	191	32	84
A. Agricultural and related	8	—	3	3	—	2
B. Biological and medical laboratory	383	8	204	97	20	54
1. Bacteriology (microbiology)	33	4	11	7	5	6
2. Biochemistry	38	—	10	11	6	11
3. Tissue (histology)	10	—	5	4	—	1
4. Cytology	14	—	3	6	2	3
5. Hematology	18	—	11	7	—	—
6. Blood bank	14	—	8	4	1	1
7. Serology	4	—	4	—	—	—
8. General and other	252	4	152	58	6	32
C. General medical assistants, doctor's office (other than nurse or secretary)	—	—	—	—	—	—
D. X-ray and related equipment technicians	76	3	28	41	1	3
E. Other medical technicians	53	1	44	5	1	2
1. Electrocardiograph	9	1	6	—	1	1
2. Electroencephalograph	6	—	5	1	—	—
3. Inhalation therapy	7	—	6	1	—	—
4. Other	31	—	27	3	—	1
F. Therapists	264	12	211	32	4	5
1. Physical	133	5	114	11	1	2
2. Occupational, recreational, and other	131	7	97	21	3	3
G. Medical record librarians	16	—	9	5	1	1
H. Dental laboratory technicians	132	—	105	6	4	17
1. Ceramists	10	—	6	—	4	—
2. Dental mechanics	122	—	99	6	—	17
I. Dental hygienists	47	—	45	1	1	—
J. Dental assistants	58	—	57	1	—	—
VII. Industrial engineering technicians and related specialists	94	6	49	14	16	9
A. Industrial engineering technicians	34	—	16	11	3	4
1. Time and motion study men and standards setters	20	—	12	6	—	2
2. Industrial process methods men	12	—	2	5	3	2
3. General	2	—	2	—	—	—
B. Quality control and reliability technicians	13	3	6	—	3	1
C. Production planners, estimators, and related specialists	41	—	26	3	8	4
1. Production planners	10	—	6	—	4	—
2. Production cost estimators	12	—	12	—	—	—
3. Production schedulers, coordinators, and expediters	5	—	5	—	—	—
4. Parts, equipment, and materials estimators, standardizers, coordinators, and catalogers	6	—	3	3	—	—
5. General	8	—	—	—	4	4
D. Equipment specialists	6	3	1	—	2	—
1. Electro equipment and systems	—	—	—	—	—	—
2. Industrial machinery, equipment, and tools	1	—	1	—	—	—
3. Ship and marine equipment	—	—	—	—	—	—
4. Aircraft, missiles, and automotive equipment	—	—	—	—	—	—

Continued

Table 27. NUMBER OF VACANCIES REPORTED IN EACH TECHNICAL OCCUPATION, BY GRADE

Technical occupation	All grades	Supervisory grades	Nonsupervisory grades			
			Single grade only	Multi-grade		
				Lowest grades	Middle grades	Highest grades
VII. Industrial engineering technicians and specialists (continued)						
5. Ordnance	—	—	—	—	—	—
6. General and other	5	3	—	—	2	—
VIII. Civil engineering and construction technicians and specialists	574	1	289	141	59	84
A. Surveyors and related specialists	34	—	31	2	1	—
1. Surveyors	15	—	14	1	—	—
2. Instrumentmen	10	—	10	—	—	—
3. General and other	9	—	7	1	1	—
B. Civil engineering and construction technicians	277	1	102	71	34	69
1. Buildings	32	1	31	—	—	—
2. Highway, street, and other heavy construction	5	—	—	4	—	1
3. General and other	240	—	71	67	34	68
C. Construction inspectors	112	—	14	61	24	13
1. Building structures	36	—	7	22	—	7
2. Electrical and mechanical equipment	45	—	—	21	23	1
3. Plumbing	3	—	1	1	—	1
4. Heating, air conditioning, and related equipment	1	—	—	1	—	—
5. General and other	27	—	6	16	1	4
D. Construction specification writers and cost estimators	151	—	142	7	—	2
1. Specification writers	1	—	1	—	—	—
a. Architectural and structural	1	—	1	—	—	—
b. Mechanical and electrical	—	—	—	—	—	—
c. Highway, street, and related construction	—	—	—	—	—	—
2. Cost estimators	150	—	141	7	—	2
a. Architectural and structural	60	—	58	2	—	—
b. Mechanical and electrical	49	—	43	4	—	2
c. Highway, street, and related construction	21	—	21	—	—	—
d. General	20	—	19	1	—	—
3. Combination: specification writers and cost estimators	—	—	—	—	—	—
a. Architectural and structural	—	—	—	—	—	—
b. Mechanical and electrical	—	—	—	—	—	—
c. Highway, street, and related construction	—	—	—	—	—	—
d. General and other	—	—	—	—	—	—
IX. Sales and service technicians	27	—	27	—	—	—
X. Technical writing and illustration specialists	117	1	92	10	6	8
A. Technical writers and related specialists	85	1	66	7	4	7
1. Technical writers and editors	70	1	52	7	4	6
2. Specifications writers, other than construction	15	—	14	—	—	1
B. Technical illustrators	32	—	26	3	2	1
C. General and other	—	—	—	—	—	—
XI. Safety and sanitation inspectors and related specialists	154	11	23	88	8	24
A. Industrial safety and fire prevention	110	2	17	75	6	10
B. Sanitation	44	9	6	13	2	14
C. Air safety	—	—	—	—	—	—
XII. Product testing and inspection specialists	115	1	78	24	4	8
A. Instruments, meters, and related equipment	13	—	5	8	—	—
1. Testing, measuring, and control instruments	7	—	5	2	—	—
a. Electronic-electrical	3	—	1	2	—	—
b. General and other n.e.c.	4	—	4	—	—	—
2. Optical and photographic	—	—	—	—	—	—
3. Water, electric, and gas meters	4	—	—	4	—	—
4. Weights and measures	2	—	—	2	—	—

Continued

Table 27. NUMBER OF VACANCIES REPORTED IN EACH TECHNICAL OCCUPATION, BY GRADE

Technical occupation	All grades	Supervisory grades	Nonsupervisory grades			
			Single grade only	Multi-grade		
				Lowest grades	Middle grades	Highest grades
XII. Product testing and inspection specialists (continued)						
B. Machinery, transportation and other metal equipment, and appliances n.e.c.	21	—	18	1	—	2
1. Industrial machinery and equipment	8	—	8	—	—	—
a. Electronic-electrical	4	—	4	—	—	—
b. General and other n.e.c.	4	—	4	—	—	—
2. Aircraft equipment	—	—	—	—	—	—
3. Automotive equipment	6	—	5	—	—	1
4. Office equipment	—	—	—	—	—	—
5. Household appliances	2	—	2	—	—	—
6. Military equipment	—	—	—	—	—	—
7. Metal castings, machined parts, and related materials	5	—	3	1	—	1
C. Chemical and other nonmetal products n.e.c.	61	—	54	1	4	2
1. Chemical and related products	46	—	46	—	—	—
a. Chemical and petroleum	33	—	33	—	—	—
b. Other	13	—	13	—	—	—
2. Construction materials	9	—	4	1	4	—
3. Paper and related products	—	—	—	—	—	—
a. Paper and pulp	—	—	—	—	—	—
b. Wood and other	—	—	—	—	—	—
4. Rubber and plastic products	1	—	1	—	—	—
5. Textiles and related products	—	—	—	—	—	—
a. Cloth	—	—	—	—	—	—
b. Other	—	—	—	—	—	—
6. Other	5	—	3	—	—	2
D. Food and agricultural products	2	1	1	—	—	—
1. Milk and milk products	—	—	—	—	—	—
2. General and other	2	1	1	—	—	—
E. Industrial X-ray and related processes	16	—	—	12	—	4
1. Industrial X-ray and radiography	16	—	—	12	—	4
2. General and other	—	—	—	—	—	—
F. General and other	2	—	—	2	—	—
XIII. Data-processing systems analysis and programming specialists	192	5	44	83	28	32
A. Systems analysts	41	3	14	9	3	12
B. Programmers	139	1	26	69	25	18
1. Business and accounting	93	1	16	54	13	9
2. Engineering and scientific	17	—	10	6	—	1
3. Combination: business and engineering	29	—	—	9	12	8
C. Combination: systems analysis and programming	9	1	2	4	—	2
D. Project planners	3	—	2	1	—	—
XIV. Airway tower specialists and flight dispatchers	—	—	—	—	—	—
A. Airway tower specialists	—	—	—	—	—	—
B. Flight dispatchers	—	—	—	—	—	—
XV. Broadcasting, motion picture, and recording studio specialists	10	4	1	2	—	3
A. Studio technicians	1	—	1	—	—	—
1. Technical directors	—	—	—	—	—	—
2. Light	1	—	1	—	—	—
3. Audio and acoustics	—	—	—	—	—	—
4. Sound effects	—	—	—	—	—	—
5. Video control	—	—	—	—	—	—
6. Recording	—	—	—	—	—	—
7. Studio field	—	—	—	—	—	—
8. General	—	—	—	—	—	—

Continued

Table 27. NUMBER OF VACANCIES REPORTED IN EACH TECHNICAL OCCUPATION, BY GRADE

Technical occupation	All grades	Supervisory grades	Nonsupervisory grades			
			Single grade only	Multi-grade		
				Lowest grades	Middle grades	Highest grades
XV. Broadcasting, motion picture, and recording studio specialists (continued)						
B. Video tape and kinescope technicians	—	—	—	—	—	—
C. Equipment and maintenance technicians	9	4	—	2	—	3
1. Transmitter	7	2	—	2	—	3
2. Transmission	—	—	—	—	—	—
3. Maintenance	—	—	—	—	—	—
4. General	2	2	—	—	—	—

Table 28. METHOD OF OBTAINING WORKERS FOR EACH TECHNICAL OCCUPATION GROUP, BY GRADE

(Percent distribution of persons in technical occupations)

Technical occupation group	All grades	Supervisory grades	Nonsupervisory grades				Grading system not reported
			Single grade only	Multi-grade			
				Lowest grades	Middle grades	Highest grades	
All technical occupations	148,684	7,281	75,909	24,197	11,875	22,875	6,547
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	57.4	19.3	72.9	68.1	31.6	27.9	31.1
Upgraded with organized training	5.8	8.2	6.2	3.5	7.4	6.9	0.4
Upgraded without organized training	36.8	72.5	20.9	28.4	61.0	65.2	68.5
Draftsmen	20,972	536	10,564	3,178	2,239	4,162	293
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	69.0	25.4	86.6	78.9	40.1	39.4	53.5
Upgraded with organized training	2.5	2.2	0.5	3.4	8.5	3.5	1.4
Upgraded without organized training	28.5	72.4	12.9	17.7	51.4	57.1	45.1
Structural design technicians and related specialists	2,516	141	920	408	227	820	—
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	—
Recruited from outside the firm	51.7	19.1	67.3	58.6	37.4	40.4	—
Upgraded with organized training	0.7	—	1.1	1.0	0.9	0.1	—
Upgraded without organized training	47.6	80.9	31.6	40.4	61.7	59.5	—
Electro and mechanical engineering technicians	42,031	2,088	20,087	6,185	3,193	6,992	3,486
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	42.1	8.3	56.4	51.5	22.5	21.7	21.8
Upgraded with organized training	10.0	1.8	17.3	3.3	6.4	4.0	0.2
Upgraded without organized training	47.9	89.9	26.3	45.2	71.1	74.3	78.0
Mathematics technicians	831	46	460	129	85	57	54
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	60.9	—	80.2	71.3	22.4	19.3	27.8
Upgraded with organized training	1.0	—	1.5	—	1.2	—	—
Upgraded without organized training	38.1	100.0	18.3	28.7	76.4	80.7	72.2
Physical science technicians	8,969	233	3,160	2,234	1,480	1,376	486
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	52.3	7.7	73.7	68.7	22.5	25.7	25.1
Upgraded with organized training	2.0	0.4	1.6	2.5	2.5	2.8	—
Upgraded without organized training	45.7	91.9	24.7	28.8	75.0	71.5	74.9
Biological, medical, dental, and related science technicians	25,445	1,039	16,992	3,216	1,217	2,465	516
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	81.5	49.9	91.9	83.2	43.7	46.2	50.4
Upgraded with organized training	1.2	1.3	1.2	1.8	0.7	0.8	0.4
Upgraded without organized training	17.3	48.8	6.9	15.0	55.6	53.0	49.2
Industrial engineering technicians and related specialists	6,901	590	3,018	725	702	1,077	789
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	36.6	18.5	41.5	40.1	44.2	19.6	44.5
Upgraded with organized training	14.3	37.3	16.2	3.0	5.7	19.0	1.4
Upgraded without organized training	49.1	44.2	42.3	56.9	50.1	61.4	54.1

Continued

Table 28. METHOD OF OBTAINING WORKERS FOR EACH TECHNICAL OCCUPATION GROUP, BY GRADE

(Percent distribution of persons in technical occupations)

Technical occupation group	All grades	Supervisory grades	Nonsupervisory grades				Grading system not reported
			Single grade only	Multi-grade			
				Lowest grades	Middle grades	Highest grades	
Civil engineering and construction technicians and specialists	13,464	493	7,945	2,211	1,066	1,749	—
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	—
Recruited from outside the firm	60.5	27.8	69.5	75.9	40.7	21.9	—
Upgraded with organized training	2.8	12.4	0.8	0.6	11.5	6.3	—
Upgraded without organized training	36.7	59.8	29.7	23.5	47.8	71.8	—
Sales and service technicians	1,932	46	1,695	111	3	77	—
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	—
Recruited from outside the firm	74.0	6.5	76.6	98.2	—	26.0	—
Upgraded with organized training	1.1	—	0.5	—	—	16.9	—
Upgraded without organized training	24.9	93.5	22.9	1.8	100.0	57.1	—
Technical writing and illustration specialists	3,034	255	1,349	536	211	488	195
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	66.4	23.5	89.7	79.5	41.7	30.9	41.0
Upgraded with organized training	0.7	0.8	0.1	—	—	3.7	—
Upgraded without organized training	32.9	75.7	10.2	20.5	58.3	65.4	59.0
Safety and sanitation inspectors and related specialists	4,084	277	1,156	1,750	171	726	4
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	66.3	1.8	79.5	99.4	15.2	2.1	50.0
Upgraded with organized training	2.7	6.5	2.7	—	—	8.7	—
Upgraded without organized training	31.0	91.7	17.8	0.6	84.8	89.2	50.0
Product testing and inspection specialists	8,059	366	3,720	1,589	609	1,236	539
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	47.1	5.2	55.4	68.3	27.8	24.0	30.8
Upgraded with organized training	1.9	1.6	2.8	1.1	0.2	1.9	—
Upgraded without organized training	51.0	93.2	41.8	30.6	72.0	74.1	69.2
Data-processing systems analysis and programming specialists	6,153	645	2,694	1,143	446	1,040	185
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	49.3	20.3	64.6	51.7	31.4	29.3	66.5
Upgraded with organized training	10.9	10.2	8.6	12.5	14.1	16.2	1.1
Upgraded without organized training	39.8	69.5	26.8	35.8	54.5	54.5	32.4
Airway tower specialists and flight dispatchers	1,373	190	132	316	220	515	—
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	—
Recruited from outside the firm	11.6	—	70.5	20.9	—	—	—
Upgraded with organized training	79.2	84.2	1.5	72.8	95.5	94.2	—
Upgraded without organized training	9.2	15.8	28.0	6.3	4.5	5.8	—
Broadcasting, motion picture, and recording studio specialists	2,920	336	2,017	466	6	95	—
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	—
Recruited from outside the firm	74.1	19.0	91.1	53.9	16.7	11.6	—
Upgraded with organized training	0.5	0.6	—	0.6	83.3	4.2	—
Upgraded without organized training	25.4	80.4	8.9	45.5	—	84.2	—

Table 29. METHOD OF OBTAINING ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS IN RELATION TO FIELD AND FUNCTION, BY GRADE

(Percent distribution of persons in technical occupations)

Field by function	All grades	Supervisory grades	Nonsupervisory grades				Grading system not reported
			Single grade only	Multi-grade			
				Lowest grades	Middle grades	Highest grades	
All fields	42,031	2,088	20,087	6,185	3,193	6,992	3,486
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	42.1	8.3	56.4	51.5	22.5	21.7	21.8
Upgraded with organized training	10.0	1.8	17.3	3.3	6.4	4.0	0.2
Upgraded without organized training	47.9	89.9	26.3	45.2	71.1	74.3	78.0
Design	7,689	325	2,570	1,789	1,017	1,931	57
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	35.8	26.5	65.3	31.9	12.9	14.5	15.8
Upgraded with organized training	3.3	4.9	4.0	3.2	4.4	1.6	—
Upgraded without organized training	60.9	68.6	30.7	64.9	82.7	83.9	84.2
Development	11,936	415	4,892	1,639	1,176	2,130	1,684
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	40.6	11.1	46.1	66.3	33.8	29.3	26.0
Upgraded with organized training	4.8	3.4	8.0	2.1	3.7	3.9	—
Upgraded without organized training	54.6	85.5	45.9	31.6	62.5	66.8	74.0
Troubleshooting	22,406	1,348	12,625	2,757	1,000	2,931	1,745
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	44.9	3.1	58.4	55.6	19.2	20.8	17.9
Upgraded with organized training	15.2	0.6	23.7	4.0	11.4	5.8	0.3
Upgraded without organized training	39.9	96.3	17.9	40.4	69.4	73.4	81.8
Electronic	10,791	552	3,906	1,723	887	2,225	1,498
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	45.5	5.6	70.4	58.6	29.5	25.6	19.6
Upgraded with organized training	2.7	2.7	0.6	4.5	12.9	2.9	—
Upgraded without organized training	51.8	91.7	29.0	36.9	57.6	71.5	80.4
Design	489	2	101	149	46	191	—
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	—
Recruited from outside the firm	31.1	—	73.3	51.0	—	1.0	—
Upgraded with organized training	2.5	—	—	8.1	—	—	—
Upgraded without organized training	66.4	100.0	26.7	40.9	100.0	99.0	—
Development	4,873	156	1,778	570	472	921	976
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	46.5	7.1	58.6	67.9	38.1	41.0	27.3
Upgraded with organized training	2.4	7.1	0.6	—	8.3	6.0	—
Upgraded without organized training	51.1	85.8	40.8	32.1	53.6	53.0	72.7
Troubleshooting	5,429	394	2,027	1,004	369	1,113	522
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	46.0	5.1	80.6	54.4	22.2	17.0	5.4
Upgraded with organized training	3.1	1.0	0.7	6.5	20.3	0.9	—
Upgraded without organized training	50.9	93.9	18.7	39.1	57.5	82.1	94.6
Electrical	8,794	361	4,468	1,487	687	1,388	403
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	33.5	5.3	38.5	51.8	24.0	14.8	16.6
Upgraded with organized training	20.4	0.6	37.8	1.3	0.7	5.7	—
Upgraded without organized training	46.1	94.1	23.7	46.9	75.3	79.5	83.4
Design	1,006	31	165	302	207	298	3
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	25.7	12.9	61.9	28.5	14.0	12.8	—
Upgraded with organized training	0.8	—	4.8	—	—	—	—
Upgraded without organized training	73.5	87.1	33.3	71.5	86.0	87.2	100.0

Continued

Table 29. METHOD OF OBTAINING ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS IN RELATION TO FIELD AND FUNCTION, BY GRADE

(Percent distribution of persons in technical occupations)

Field by function	All grades	Supervisory grades	Nonsupervisory grades				Grading system not reported
			Single grade only	Multi-grade			
				Lowest grades	Middle grades	Highest grades	
Electrical (continued)							
Development	2,497	47	1,222	350	253	405	220
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	39.8	4.3	38.1	71.1	39.9	30.9	23.2
Upgraded with organized training	15.1	—	29.9	2.3	—	0.7	—
Upgraded without organized training	45.1	95.7	32.0	26.6	60.1	68.4	76.8
Troubleshooting	5,291	283	3,081	835	227	685	180
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	32.1	4.6	37.5	52.0	15.4	6.3	8.9
Upgraded with organized training	26.6	0.7	42.6	1.4	2.2	11.1	—
Upgraded without organized training	41.3	94.7	19.9	46.6	82.4	82.6	91.1
Mechanical	8,461	326	3,783	1,471	814	1,643	424
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	44.1	25.5	62.5	52.5	19.2	15.9	21.7
Upgraded with organized training	3.9	5.8	4.0	3.9	5.5	3.0	1.4
Upgraded without organized training	52.0	68.7	33.5	43.6	75.3	81.1	76.9
Design	4,450	203	1,950	772	464	1,007	54
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	43.9	35.5	68.7	39.8	17.5	14.5	16.7
Upgraded with organized training	3.4	7.9	1.5	3.9	9.7	2.9	—
Upgraded without organized training	52.7	56.6	29.8	56.3	72.8	82.6	83.3
Development	2,092	63	850	383	231	341	224
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	42.3	14.3	57.0	60.9	20.3	18.8	21.4
Upgraded with organized training	3.0	4.8	1.4	7.0	—	5.9	—
Upgraded without organized training	54.7	80.9	41.6	32.1	79.7	75.3	78.6
Troubleshooting	1,919	60	983	316	119	295	146
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	46.4	3.3	55.0	73.7	23.5	17.6	24.0
Upgraded with organized training	5.9	—	11.0	—	—	—	4.1
Upgraded without organized training	47.7	96.7	34.0	26.3	76.5	82.4	71.9
Electro-mechanical	13,985	849	7,930	1,504	805	1,736	1,161
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	43.5	4.8	56.5	42.4	17.0	27.5	26.4
Upgraded with organized training	12.9	0.2	20.4	3.3	4.8	5.2	—
Upgraded without organized training	43.6	95.0	23.1	54.3	78.2	67.3	73.6
Design	1,744	89	354	566	300	435	—
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	—
Recruited from outside the firm	22.3	11.2	46.0	17.8	7.0	21.6	—
Upgraded with organized training	4.6	—	18.4	2.7	—	0.2	—
Upgraded without organized training	73.1	88.8	35.6	79.5	93.0	78.2	—
Development	2,474	149	1,042	336	220	463	264
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	28.6	16.1	25.6	64.6	31.4	12.5	27.3
Upgraded with organized training	0.5	—	0.2	—	2.3	1.3	—
Upgraded without organized training	70.9	83.9	74.2	35.4	66.3	86.2	72.7
Troubleshooting	9,767	611	6,534	602	285	838	897
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	51.0	1.1	62.0	53.0	16.5	38.8	26.1
Upgraded with organized training	17.5	0.3	23.8	5.6	11.9	9.9	—
Upgraded without organized training	31.5	98.6	14.2	41.4	71.6	51.3	73.9

Table 30. METHOD OF OBTAINING WORKERS FOR EACH TECHNICAL OCCUPATION GROUP, BY INDUSTRY DIVISION

(Percent distribution of persons in technical occupations)

Technical occupation group	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
All technical occupations	148,684	59,085	7,523	14,084	16,496	14,749	3,754	21,063	11,930
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	57.4	46.3	68.4	42.1	86.9	71.9	71.8	50.7	72.6
Upgraded with organized training	5.8	2.6	1.5	16.9	1.4	0.5	—	18.3	4.2
Upgraded without organized training	36.8	51.1	30.1	41.0	11.7	27.6	28.2	31.0	23.2
Draftsmen	20,972	9,357	1,163	1,055	5	6,923	67	1,072	1,330
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	69.0	61.2	86.2	43.4	100.0	81.4	73.1	52.3	78.7
Upgraded with organized training	2.5	4.3	—	1.7	—	0.2	—	6.7	0.5
Upgraded without organized training	28.5	34.5	13.8	54.9	—	18.4	26.9	41.0	20.8
Structural design technicians and related specialists	2,516	495	329	83	—	1,339	5	126	139
Percent distribution, total	100.0	100.0	100.0	100.0	—	100.0	100.0	100.0	100.0
Recruited from outside the firm	51.7	48.5	59.6	12.0	—	53.2	40.0	53.9	52.5
Upgraded with organized training	0.7	—	—	—	—	0.7	—	5.6	—
Upgraded without organized training	47.6	51.5	40.4	88.0	—	46.1	60.0	40.5	47.5
Electro and mechanical engineering technicians	42,031	23,632	154	8,911	13	2,163	583	2,506	4,069
Percent distribution, total	100.0	100.0	100.0	100.0	—	100.0	100.0	100.0	100.0
Recruited from outside the firm	42.1	39.2	85.7	36.2	846	53.3	80.3	12.9	76.1
Upgraded with organized training	10.0	1.9	—	25.4	—	0.4	—	53.3	4.2
Upgraded without organized training	47.9	58.9	14.3	38.4	15.4	46.3	19.7	33.8	19.7
Mathematics technicians	831	621	—	—	1	143	56	10	—
Percent distribution, total	100.0	100.0	—	—	100.0	100.0	100.0	100.0	—
Recruited from outside the firm	60.9	58.6	—	—	100.0	54.5	100.0	70.0	—
Upgraded with organized training	1.0	1.1	—	—	—	—	—	10.0	—
Upgraded without organized training	38.1	40.3	—	—	—	45.5	—	20.0	—
Physical science technicians	8,969	6,756	5	125	10	547	650	560	316
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	52.3	47.7	100.0	51.2	100.0	51.6	76.9	61.6	83.2
Upgraded with organized training	2.0	2.3	—	—	—	—	—	4.5	—
Upgraded without organized training	45.7	50.0	—	48.8	—	48.4	23.1	33.9	16.8
Biological, medical, dental, and related science technicians	25,445	488	—	12	16,454	75	2,199	5,389	828
Percent distribution, total	100.0	100.0	—	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	81.5	54.9	—	100.0	86.9	100.0	66.2	71.8	90.7
Upgraded with organized training	1.2	2.7	—	—	1.4	—	—	1.3	—
Upgraded without organized training	17.3	42.4	—	—	11.7	—	33.8	26.9	9.3

Continued

Table 30. METHOD OF OBTAINING WORKERS FOR EACH TECHNICAL OCCUPATION GROUP, BY INDUSTRY DIVISION

(Percent distribution of persons in technical occupations)

Technical occupation group	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
Industrial engineering technicians and related specialists	6,901	5,230	—	120	—	247	19	1,145	140
Percent distribution, total	100.0	100.0	—	100.0	—	100.0	100.0	100.0	100.0
Recruited from outside the firm	36.6	38.8	—	30.0	—	62.8	89.5	18.6	53.6
Upgraded with organized training	14.3	3.1	—	—	—	—	—	72.0	—
Upgraded without organized training	49.1	58.1	—	70.0	—	37.2	10.5	9.4	46.4
Civil engineering and construction technicians and specialists	13,464	130	5,765	664	—	2,106	16	4,633	150
Percent distribution, total	100.0	100.0	100.0	100.0	—	100.0	100.0	100.0	100.0
Recruited from outside the firm	60.5	61.5	64.8	21.1	—	72.9	100.0	54.6	81.3
Upgraded with organized training	2.8	—	1.9	—	—	—	—	5.6	0.7
Upgraded without organized training	36.7	38.5	33.3	78.9	—	27.1	—	39.8	18.0
Sales and service technicians	1,932	813	86	—	1	9	—	52	971
Percent distribution, total	100.0	100.0	100.0	—	100.0	100.0	—	100.0	100.0
Recruited from outside the firm	74.0	54.5	76.7	—	100.0	88.9	—	32.7	92.1
Upgraded with organized training	1.1	1.1	—	—	—	—	—	—	1.3
Upgraded without organized training	24.9	44.4	23.3	—	—	11.1	—	67.3	6.6
Technical writing and illustration specialists	3,034	2,205	—	35	—	615	11	78	90
Percent distribution, total	100.0	100.0	—	100.0	—	100.0	100.0	100.0	100.0
Recruited from outside the firm	66.4	62.5	—	42.9	—	82.0	81.8	43.6	84.4
Upgraded with organized training	0.7	0.1	—	—	—	2.6	—	2.6	—
Upgraded without organized training	32.9	37.4	—	57.1	—	15.4	18.2	53.8	15.6
Safety and sanitation inspectors and related specialists	4,084	268	8	15	1	27	2	3,240	523
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	66.3	51.1	75.0	6.7	100.0	100.0	100.0	64.9	82.6
Upgraded with organized training	2.7	2.6	—	13.3	—	—	—	2.4	4.6
Upgraded without organized training	31.0	46.3	25.0	80.0	—	—	—	32.7	12.8
Product testing and inspection specialists	8,059	6,853	12	77	—	338	—	620	159
Percent distribution, total	100.0	100.0	100.0	100.0	—	100.0	—	100.0	100.0
Recruited from outside the firm	47.1	43.5	58.3	29.9	—	87.6	—	57.0	88.1
Upgraded with organized training	1.9	2.2	—	—	—	—	—	0.3	—
Upgraded without organized training	51.0	54.3	41.7	70.1	—	12.4	—	42.7	11.9
Data-processing systems analysis and programming specialists	6,153	2,031	1	462	11	217	138	412	2,881
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	49.3	52.7	100.0	39.0	90.9	63.1	80.4	31.6	48.3
Upgraded with organized training	10.9	9.6	—	16.0	—	12.0	—	22.6	9.9
Upgraded without organized training	39.8	37.7	—	45.0	9.1	24.9	19.6	45.8	41.8

Table 30. METHOD OF OBTAINING WORKERS FOR EACH TECHNICAL OCCUPATION GROUP, BY INDUSTRY DIVISION

(Percent distribution of persons in technical occupations)

Technical occupation group	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
Airway tower specialists and flight dispatchers	1,373	22	—	228	—	—	—	1,123	—
Percent distribution, total	100.0	100.0	—	100.0	—	—	—	100.0	—
Recruited from outside the firm	11.6	81.8	—	38.6	—	—	—	4.7	—
Upgraded with organized training	79.2	—	—	7.5	—	—	—	95.3	—
Upgraded without organized training	9.2	18.2	—	53.9	—	—	—	—	—
Broadcasting, motion picture, and recording studio specialists	2,920	184	—	2,297	—	—	8	97	334
Percent distribution, total	100.0	100.0	—	100.0	—	—	100.0	100.0	100.0
Recruited from outside the firm	74.1	64.7	—	73.3	—	—	100.0	62.9	88.3
Upgraded with organized training	0.5	—	—	—	—	—	—	13.4	—
Upgraded without organized training	25.4	35.3	—	26.7	—	—	—	23.7	11.7

[a] Includes architectural as well as engineering service enterprises; research, development, and testing laboratories; and business and management consulting services.

Table 31. METHOD OF OBTAINING ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS IN RELATION TO FIELD AND FUNCTION, BY INDUSTRY DIVISION

(Percent distribution of persons in technical occupations)

Field by function	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
All fields	42,031	23,632	154	8,911	13	2,163	583	2,506	4,069
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	42.1	39.2	85.7	36.2	84.6	53.3	80.3	12.9	76.1
Upgraded with organized training	10.0	1.9	—	25.4	—	0.4	—	53.3	4.2
Upgraded without organized training	47.9	58.9	14.3	38.4	15.4	46.3	19.7	33.8	19.7
Design	7,689	6.073	2	273	—	919	33	122	267
Percent distribution, total	100.0	100.0	100.0	100.0	—	100.0	100.0	100.0	100.0
Recruited from outside the firm	35.8	34.2	100.0	8.8	—	51.9	97.0	22.1	43.8
Upgraded with organized training	3.3	3.9	—	1.5	—	—	—	8.2	—
Upgraded without organized training	60.9	61.9	—	89.7	—	48.1	3.0	69.7	56.2
Development	11,936	8,873	2	479	9	1,063	357	644	509
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	40.6	41.1	100.0	36.7	100.0	52.0	77.6	9.8	24.4
Upgraded with organized training	4.8	1.4	—	—	—	0.8	—	68.0	—
Upgraded without organized training	54.6	57.5	—	63.3	—	47.2	22.4	22.2	75.6
Troubleshooting	22,406	8,686	150	8,159	4	181	193	1,740	3,293
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	44.9	40.8	85.3	37.1	50.0	68.0	82.4	13.4	86.7
Upgraded with organized training	15.2	0.9	—	27.7	—	—	—	51.0	5.2
Upgraded without organized training	39.9	58.3	14.7	35.2	50.0	32.0	17.6	35.6	8.1
Electronic	10,791	7,840	2	390	3	704	148	1,049	655
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	45.5	45.7	100.0	60.5	66.7	57.1	87.2	17.4	57.7
Upgraded with organized training	2.7	1.0	—	—	—	—	—	16.6	6.1
Upgraded without organized training	51.8	53.3	—	39.5	33.3	42.9	12.8	66.0	36.2
Design	489	393	—	—	—	93	—	—	3
Percent distribution, total	100.0	100.0	—	—	—	100.0	—	—	100.0
Recruited from outside the firm	31.1	20.4	—	—	—	74.2	—	—	100.0
Upgraded with organized training	2.5	3.1	—	—	—	—	—	—	—
Upgraded without organized training	66.4	76.5	—	—	—	25.8	—	—	—
Development	4,873	3,734	2	44	—	560	50	234	249
Percent distribution, total	100.0	100.0	100.0	100.0	—	100.0	100.0	100.0	100.0
Recruited from outside the firm	46.5	48.6	100.0	15.9	—	53.6	78.0	14.1	28.1
Upgraded with organized training	2.4	1.3	—	—	—	—	—	28.6	—
Upgraded without organized training	51.1	50.1	—	84.1	—	46.4	22.0	57.3	71.9

Continued

Table 31. METHOD OF OBTAINING ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS IN RELATION TO FIELD AND FUNCTION, BY INDUSTRY DIVISION

(Percent distribution of persons in technical occupations)

Field by function	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
Electronic (continued)									
Troubleshooting	5,429	3,713	—	346	3	51	98	815	403
Percent distribution, total	100.0	100.0	—	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	46.0	45.5	—	66.2	66.7	64.7	91.8	18.4	75.7
Upgraded with organized training	3.1	0.6	—	—	—	—	—	13.1	9.9
Upgraded without organized training	50.9	53.9	—	33.8	33.3	35.3	8.2	68.5	14.4
Electrical	8,794	3,546	—	3,594	—	341	123	1,052	138
Percent distribution, total	100.0	100.0	—	100.0	—	100.0	100.0	100.0	100.0
Recruited from outside the firm	33.5	42.4	—	30.6	—	50.7	78.9	3.5	26.8
Upgraded with organized training	20.4	1.6	—	20.2	—	0.6	—	95.9	—
Upgraded without organized training	46.1	56.0	—	49.2	—	48.7	21.1	0.6	73.2
Design	1,006	701	—	152	—	108	2	4	39
Percent distribution, total	100.0	100.0	—	100.0	—	100.0	100.0	100.0	100.0
Recruited from outside the firm	25.7	27.4	—	11.2	—	29.6	100.0	75.0	33.3
Upgraded with organized training	0.8	0.6	—	2.6	—	—	—	—	—
Upgraded without organized training	73.5	72.0	—	86.2	—	70.4	—	25.0	66.7
Development	2,497	1,564	—	272	—	177	93	356	35
Percent distribution, total	100.0	100.0	—	100.0	—	100.0	100.0	100.0	100.0
Recruited from outside the firm	39.8	43.0	—	50.4	—	55.4	74.2	2.2	28.6
Upgraded with organized training	15.1	1.7	—	—	—	1.1	—	97.8	—
Upgraded without organized training	45.1	55.3	—	49.6	—	43.5	25.8	—	71.4
Troubleshooting	5,291	1,281	—	3,170	—	56	28	692	64
Percent distribution, total	100.0	100.0	—	100.0	—	100.0	100.0	100.0	100.0
Recruited from outside the firm	32.1	50.0	—	29.8	—	76.8	92.9	3.8	21.9
Upgraded with organized training	26.6	2.0	—	22.8	—	—	—	95.5	—
Upgraded without organized training	41.3	48.0	—	47.4	—	23.2	7.1	0.7	78.1
Mechanical	8,461	6,503	152	380	9	558	272	217	370
Percent distribution, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	44.1	41.4	85.5	33.2	100.0	59.5	77.2	24.0	48.7
Upgraded with organized training	3.9	3.0	—	—	—	1.1	—	30.0	16.2
Upgraded without organized training	52.0	55.6	14.5	66.8	—	39.4	22.8	46.0	35.1
Design	4,450	3,743	2	121	—	372	31	105	76
Percent distribution, total	100.0	100.0	100.0	100.0	—	100.0	100.0	100.0	100.0
Recruited from outside the firm	43.9	42.9	100.0	5.8	—	64.2	96.8	21.0	63.2
Upgraded with organized training	3.4	3.8	—	—	—	—	—	8.6	—
Upgraded without organized training	52.7	53.3	—	94.2	—	35.8	3.2	70.4	36.8

Continued

Table 31. METHOD OF OBTAINING ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS IN RELATION TO FIELD AND FUNCTION, BY INDUSTRY DIVISION

(Percent distribution of persons in technical occupations)

Field by function	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
Mechanical (continued)									
Development	2,092	1,510	—	66	9	171	188	33	115
Percent distribution, total	100.0	100.0	—	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	42.3	39.8	—	30.3	100.0	48.5	77.7	6.1	20.9
Upgraded with organized training	3.0	2.2	—	—	—	3.5	—	69.7	—
Upgraded without organized training	54.7	58.0	—	69.7	—	48.0	22.3	24.2	79.1
Troubleshooting	1,919	1,250	150	193	—	15	53	79	179
Percent distribution, total	100.0	100.0	100.0	100.0	—	100.0	100.0	100.0	100.0
Recruited from outside the firm	46.4	38.7	85.3	51.3	—	66.7	64.2	35.4	60.4
Upgraded with organized training	5.9	1.7	—	—	—	—	—	41.8	33.5
Upgraded without organized training	47.7	59.6	14.7	48.7	—	33.3	35.8	22.8	6.1
Electro-mechanical	13,985	5,743	—	4,547	1	560	40	188	2,906
Percent distribution, total	100.0	100.0	—	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	43.5	25.8	—	38.7	—	43.9	80.0	27.7	86.1
Upgraded with organized training	12.9	1.8	—	33.8	—	—	—	46.2	2.4
Upgraded without organized training	43.6	72.4	—	27.5	100.0	56.1	20.0	26.1	11.5
Design	1,744	1,236	—	—	—	346	—	13	149
Percent distribution, total	100.0	100.0	—	—	—	100.0	—	100.0	100.0
Recruited from outside the firm	22.3	15.9	—	—	—	39.6	—	15.4	35.6
Upgraded with organized training	4.6	6.5	—	—	—	—	—	7.7	—
Upgraded without organized training	73.1	77.6	—	—	—	60.4	—	76.9	64.4
Development	2,474	2,065	—	97	—	155	26	21	110
Percent distribution, total	100.0	100.0	—	100.0	—	100.0	100.0	100.0	100.0
Recruited from outside the firm	28.6	27.1	—	12.4	—	46.5	88.5	95.2	18.2
Upgraded with organized training	0.5	0.6	—	—	—	—	—	—	—
Upgraded without organized training	70.9	72.3	—	87.6	—	53.5	11.5	4.8	81.8
Troubleshooting	9,767	2,442	—	4,450	1	59	14	154	2,647
Percent distribution, total	100.0	100.0	—	100.0	100.0	100.0	100.0	100.0	100.0
Recruited from outside the firm	51.0	29.8	—	39.3	—	62.7	64.3	19.5	91.8
Upgraded with organized training	17.5	0.5	—	34.5	—	—	—	55.8	2.6
Upgraded without organized training	31.5	69.7	—	26.2	100.0	37.3	35.7	24.7	5.6

[a] Includes architectural as well as engineering service enterprises; research, development, and testing laboratories; and business and management consulting services.

Table 32. GRADUATES OF COLLEGE AND TECHNICAL INSTITUTES AS A PERCENT OF PERSONS IN EACH TECHNICAL OCCUPATION GROUP, BY GRADE

Technical occupation group	All grades	Supervisory grades	Nonsupervisory grades				Grading system not reported
			Single grade only	Multi-grade			
				Lowest grades	Middle grades	Highest grades	
A. College graduates							
All technical occupations	12.9	21.2	13.6	10.4	12.6	13.7	3.4
Draftsmen	9.2	22.4	10.3	5.2	6.6	9.7	0.7
Structural design technicians and related specialists	26.3	14.2	29.9	14.5	41.0	26.1	—
Electro and mechanical engineering technicians	2.2	1.9	2.0	1.7	3.3	3.4	0.3
Mathematics technicians	30.8	28.3	52.0	0.8	0.0	3.5	1.9
Physical science technicians	11.2	9.0	22.1	2.7	5.5	10.8	0.0
Biological, medical, dental, and related science technicians	21.3	43.5	16.6	24.5	45.6	32.0	2.3
Industrial engineering technicians and related specialists	8.7	20.5	8.3	5.0	8.4	11.1	1.9
Civil engineering and construction technicians and specialists	13.6	18.7	19.4	1.5	1.8	8.0	—
Sales and service technicians	34.0	45.7	35.3	21.6	0.0	15.6	—
Technical writing and illustration specialists	32.8	48.2	22.5	30.0	47.4	45.3	28.2
Safety and sanitation inspectors and related specialists	17.2	9.4	18.5	19.3	19.9	12.7	[a]
Product testing and inspection specialists	1.8	6.8	1.5	1.4	1.8	2.8	0.0
Data-processing systems analysis and programming specialists	63.5	66.4	63.6	55.8	64.3	68.8	68.1
Airway tower specialists and flight dispatchers	1.5	1.6	2.3	1.9	0.5	1.6	—
Broadcasting, motion picture, and recording studio specialists	7.0	11.9	6.1	8.2	0.0	3.2	—
B. Technical institute graduates							
All technical occupations	28.5	27.9	28.2	25.9	31.1	31.9	24.9
Draftsmen	33.9	33.6	38.3	25.5	26.3	34.6	17.1
Structural design technicians and related specialists	33.0	48.2	33.6	30.9	4.8	38.5	—
Electro and mechanical engineering technicians	30.6	29.3	25.6	33.4	44.2	40.2	23.8
Mathematics technicians	19.7	23.9	18.5	14.0	17.6	45.6	16.7
Physical science technicians	35.9	39.1	32.4	32.6	35.9	32.6	81.5
Biological, medical, dental, and related science technicians	33.1	31.9	35.5	28.2	25.6	29.6	22.1
Industrial engineering technicians and related specialists	25.5	32.2	22.2	27.2	34.3	31.8	15.3
Civil engineering and construction technicians and specialists	25.4	31.0	21.3	27.5	36.9	33.0	—
Sales and service technicians	16.2	4.3	16.9	5.4	0.0	23.4	—
Technical writing and illustration specialists	28.4	20.8	31.9	30.6	20.4	24.4	27.7
Safety and sanitation inspectors and related specialists	8.0	14.1	13.1	5.1	4.7	5.6	0.0
Product testing and inspection specialists	10.2	10.4	11.6	9.1	7.1	10.4	6.5
Data-processing systems analysis and programming specialists	4.7	3.7	5.6	3.9	3.6	2.8	13.5
Airway tower specialists and flight dispatchers	31.0	23.2	0.8	34.5	36.8	36.9	—
Broadcasting, motion picture, and recording studio specialists	50.8	59.5	47.7	53.0	0.0	75.8	—

[a] Not computed because of small number involved.

Table 33. GRADUATES OF COLLEGES AND TECHNICAL INSTITUTES AS A PERCENT OF ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS IN RELATION TO FIELD AND FUNCTION, BY GRADE

Field by function	All grades	Supervisory grades	Nonsupervisory grades				Grading system not reported
			Single grade only	Multi-grade			
				Lowest grades	Middle grades	Highest grades	
A. College graduates							
All fields	2.2	1.9	2.0	1.7	3.3	3.4	0.3
Design	7.2	8.0	6.4	5.4	9.2	8.8	1.8
Development	1.8	2.4	3.1	0.5	0.9	1.5	0.3
Troubleshooting	0.6	0.2	0.7	0.1	0.2	1.3	0.3
Electronic	1.3	1.3	1.6	0.2	0.9	2.4	0.3
Design	3.7	0.0	6.9	2.0	0.0	4.2	—
Development	1.5	3.8	2.1	0.2	1.7	1.8	0.4
Troubleshooting	0.9	0.3	0.9	0.0	0.0	2.6	0.0
Electrical	2.6	1.4	2.8	0.9	5.7	3.2	0.0
Design	9.7	12.9	5.5	3.6	18.4	12.1	0.0
Development	3.2	0.0	5.6	0.9	0.4	2.0	0.0
Troubleshooting	0.9	0.4	1.5	0.0	0.0	0.0	0.0
Mechanical	5.0	3.7	4.6	4.2	6.0	7.4	0.5
Design	8.2	4.9	6.9	7.6	10.3	11.3	1.9
Development	1.8	3.2	2.8	0.8	0.4	1.8	0.4
Troubleshooting	0.8	0.0	1.4	0.0	0.0	0.3	0.0
Electro-mechanical	0.8	1.8	0.5	1.9	1.2	1.2	0.5
Design	4.0	13.5	4.0	4.2	2.7	2.8	—
Development	1.0	1.3	1.9	0.6	0.0	0.0	0.0
Troubleshooting	0.2	0.2	0.1	0.3	0.7	1.0	0.7
B. Technical institute graduates							
All fields	30.6	29.3	25.6	33.4	44.2	40.2	23.8
Design	33.7	38.8	41.6	31.1	23.4	30.8	19.3
Development	43.4	38.3	37.8	46.9	53.9	53.5	37.6
Troubleshooting	22.7	24.2	17.6	26.8	53.9	36.7	10.5
Electronic	39.6	45.5	38.2	36.4	59.2	48.7	19.6
Design	27.0	[a]	46.5	20.8	23.9	22.0	—
Development	48.0	32.7	41.2	58.8	64.2	70.4	27.5
Troubleshooting	33.2	50.5	35.2	26.1	57.2	35.4	5.0
Electrical	25.6	19.4	19.8	30.8	39.4	33.4	24.6
Design	30.9	25.8	47.9	29.8	18.8	30.9	[a]
Development	38.2	31.9	30.4	45.7	47.8	51.9	35.0
Troubleshooting	18.6	16.6	14.1	24.9	48.9	23.6	10.6
Mechanical	33.5	38.0	36.3	28.0	35.1	32.5	25.7
Design	32.3	39.4	40.7	25.9	15.5	28.2	14.8
Development	36.1	33.3	34.7	32.6	48.9	33.1	39.7
Troubleshooting	33.6	38.3	28.9	27.5	84.9	46.4	8.2
Electro-mechanical	25.0	19.6	17.5	37.7	40.9	41.9	28.1
Design	40.9	41.6	41.8	41.7	38.7	40.7	—
Development	45.9	48.3	43.2	44.3	44.1	36.3	75.4
Troubleshooting	16.9	9.3	12.0	30.2	40.7	45.6	14.2

[a] Not computed because of small number involved.

Table 34. GRADUATES OF COLLEGES AND TECHNICAL INSTITUTES AS A PERCENT OF PERSONS IN EACH TECHNICAL OCCUPATION GROUP, BY INDUSTRY DIVISION

A. College Graduates

Technical occupation group	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
All technical occupations	12.9	7.1	20.7	4.2	15.2	17.9	47.1	13.4	26.4
Draftsmen	9.2	3.1	6.4	0.9	60.0	21.2	6.0	2.3	4.7
Structural design technicians and related specialists	26.3	28.1	25.5	20.5	—	30.2	0.0	0.0	12.2
Electro and mechanical engineering technicians	2.2	2.2	0.6	1.1	7.7	4.5	16.5	0.6	1.7
Mathematics technicians	30.8	29.6	—	—	0.0	11.2	100.0	0.0	—
Physical science technicians	11.2	4.7	0.0	20.1	100.0	6.6	62.5	25.9	21.8
Biological, medical, dental, and related science technicians	21.3	6.1	—	0.0	15.2	62.7	47.3	27.5	38.8
Industrial engineering technicians and related specialists	8.7	6.3	—	12.5	—	7.3	57.9	18.1	13.6
Civil engineering and construction technicians and specialists	13.6	23.8	23.5	0.9	—	12.5	62.5	2.9	20.7
Sales and service technicians	34.0	17.0	53.5	—	0.0	44.4	—	1.9	48.1
Technical writing and illustration specialists	32.8	38.9	—	22.9	—	15.1	72.7	21.8	12.2
Safety and sanitation inspectors and related specialists	17.2	30.2	0.0	0.0	0.0	51.9	50.0	16.0	17.0
Product testing and inspection specialists	1.8	0.8	0.0	0.0	—	8.9	—	8.5	5.0
Data-processing systems analysis and programming specialists	63.5	60.3	100.0	57.4	63.6	69.6	97.1	47.3	67.0
Airway tower specialists and flight dispatchers	1.5	0.0	—	1.3	—	—	—	1.6	—
Broadcasting, motion picture, and recording studio specialists	7.0	0.0	—	6.1	—	—	12.5	2.1	18.3

Table 34. GRADUATES OF COLLEGES AND TECHNICAL INSTITUTES AS A PERCENT OF PERSONS IN EACH TECHNICAL OCCUPATION GROUP, BY INDUSTRY DIVISION

B. Technical Institute Graduates

Technical occupation group	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
All technical occupations	28.5	30.5	28.6	15.9	35.9	35.8	18.5	26.1	21.2
Draftsmen	33.9	35.4	42.6	16.1	40.0	33.2	29.9	45.7	25.1
Structural design technicians and related specialists	33.0	7.7	64.1	18.1	—	35.5	100.0	23.0	40.3
Electro and mechanical engineering technicians	30.6	36.8	63.0	7.7	23.1	52.2	43.4	26.3	32.9
Mathematics technicians	19.7	21.9	—	—	0.0	16.1	0.0	50.0	—
Physical science technicians	35.9	37.3	100.0	4.8	0.0	67.3	10.3	20.9	44.0
Biological, medical, dental, and related science technicians	33.1	22.3	—	41.7	35.9	21.3	15.1	33.9	27.4
Industrial engineering technicians and related specialists	25.5	27.9	—	21.7	—	14.2	36.8	20.5	2.1
Civil engineering and construction technicians and specialists	25.4	36.2	23.0	7.2	—	29.4	0.0	29.4	12.7
Sales and service technicians	16.2	21.3	18.6	—	0.0	11.1	—	19.2	11.6
Technical writing and illustration specialists	28.4	27.0	—	0.0	—	36.6	18.2	29.5	18.9
Safety and sanitation inspectors and related specialists	8.0	13.8	0.0	26.7	0.0	0.0	0.0	5.6	20.1
Product testing and inspection specialists	10.2	9.6	0.0	31.2	—	21.0	—	8.1	10.7
Data-processing systems analysis and programming specialists	4.7	8.5	0.0	1.1	27.3	5.1	0.7	8.0	2.3
Airway tower specialists and flight dispatchers	31.0	4.5	—	6.6	—	—	—	36.4	—
Broadcasting, motion picture, and recording studio specialists	50.8	49.5	—	53.8	—	—	75.0	57.7	27.8

[a] Includes architectural as well as engineering service enterprises; research, development, and testing laboratories; and business and management consulting services.

Table 35. GRADUATES OF COLLEGES AND TECHNICAL INSTITUTES AS A PERCENT OF ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS IN RELATION TO FIELD AND FUNCTION, BY INDUSTRY DIVISION

A. College Graduates

Field by function	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
All fields	2.2	2.2	0.6	1.1	7.7	4.5	16.5	0.6	1.7
Design	7.2	6.2	0.0	19.4	—	9.2	6.1	0.8	13.1
Development	1.8	1.0	[b]	0.8	0.0	0.8	25.8	1.2	2.2
Troubleshooting	0.6	0.7	0.0	0.5	[b]	2.2	1.0	0.3	0.7
Electronic	1.3	1.4	[b]	0.0	[b]	0.0	6.1	0.2	2.4
Design	3.7	4.6	—	—	—	0.0	—	—	0.0
Development	1.5	1.5	[b]	0.0	—	0.0	18.0	0.9	1.6
Troubleshooting	0.9	1.0	—	0.0	[b]	0.0	0.0	0.0	3.0
Electrical	2.6	2.3	—	2.0	—	3.2	43.1	0.6	2.2
Design	9.7	9.3	—	17.8	—	2.8	0.0	0.0	7.7
Development	3.2	1.0	—	0.7	—	4.0	54.8	1.7	0.0
Troubleshooting	0.9	0.2	—	1.4	—	1.8	7.2	0.0	0.0
Mechanical	5.0	4.0	0.0	7.4	0.0	13.6	8.1	2.8	7.8
Design	8.2	6.4	0.0	21.5	—	19.6	6.5	0.0	34.2
Development	1.8	0.7	—	3.0	0.0	0.6	10.6	0.0	2.6
Troubleshooting	0.8	0.6	0.0	0.0	—	13.3	0.0	7.6	0.0
Electro-mechanical	0.8	1.3	—	0.0	0.0	2.0	30.0	0.5	0.7
Design	4.0	4.4	—	—	—	2.6	—	7.7	4.0
Development	1.0	0.3	—	0.0	—	0.6	46.2	0.0	3.6
Troubleshooting	0.2	0.5	—	0.0	0.0	1.7	0.0	0.0	0.4

Table 35. GRADUATES OF COLLEGES AND TECHNICAL INSTITUTES AS A PERCENT OF ELECTRO AND MECHANICAL ENGINEERING TECHNICIANS IN RELATION TO FIELD AND FUNCTION, BY INDUSTRY DIVISION

B. Technical Institute Graduates

Field by function	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
All fields	30.6	36.8	63.0	7.7	23.1	52.2	43.4	26.3	32.9
Design	33.7	34.2	0.0	29.7	—	28.0	66.7	24.6	47.2
Development	43.4	42.1	[b]	21.1	[b]	72.4	44.3	24.2	50.3
Troubleshooting	22.7	33.1	64.0	6.2	[b]	56.9	37.8	27.2	29.1
Electronic	39.6	36.5	[b]	12.8	0.0	71.6	38.5	46.1	48.5
Design	27.0	21.1	—	—	—	49.5	—	—	[b]
Development	48.0	43.5	[b]	34.1	—	77.1	58.0	47.4	50.2
Troubleshooting	33.2	31.1	—	10.1	0.0	51.0	28.6	45.8	47.1
Electrical	25.6	40.3	—	11.3	—	51.6	45.5	10.6	49.3
Design	30.9	28.8	—	32.2	—	25.0	[b]	[b]	76.9
Development	38.2	43.7	—	25.4	—	61.0	45.2	9.8	45.7
Troubleshooting	18.6	42.5	—	9.1	—	73.2	46.4	10.7	34.4
Mechanical	33.5	33.7	63.2	14.5	[b]	32.8	46.3	18.4	38.9
Design	32.3	34.4	0.0	26.4	—	15.9	67.7	21.0	23.7
Development	36.1	33.0	—	0.0	[b]	69.0	39.9	15.2	50.4
Troubleshooting	33.6	32.6	64.0	11.9	—	40.0	56.6	16.5	38.0
Electro-mechanical	25.0	38.4	—	3.9	[b]	47.7	35.0	13.3	27.8
Design	40.9	41.1	—	—	—	36.1	—	46.2	50.3
Development	45.9	45.1	—	17.5	—	72.3	46.2	23.8	51.8
Troubleshooting	16.9	31.4	—	3.6	[b]	50.8	14.3	9.1	25.6

[a] Includes architectural as well as engineering service enterprises; research, development, and testing laboratories; and business and management consulting services.
[b] Not computed because of small number involved.

Table 36. EDUCATION EMPLOYERS REQUIRE IN EACH TECHNICAL OCCUPATION GROUP

A. Number in Technical Occupations

Technical occupation group	All levels	Post-high-school									High school		
		Total	Engineering college		College, general		Technical institute		Type not specified	Apprenticeship or armed forces school	Total	Technical or vocational	Other and not specified
			Graduation	Less than graduation	Graduation	Less than graduation	Graduation	Less than graduation					
All technical occupations	148,684	69,554	2,200	3,588	9,702	4,315	30,803	3,771	10,563	4,612	79,130	11,376	67,754
Draftsmen	20,972	8,387	645	836	15	221	3,286	411	2,231	742	12,585	2,345	10,240
Structural design technicians and related specialists	2,516	1,419	208	473	—	80	300	29	237	92	1,097	317	780
Electro and mechanical engineering technicians	42,031	23,613	225	1,148	74	634	12,735	760	4,512	3,525	18,418	5,550	12,868
Mathematics technicians	831	675	4	15	106	385	102	—	63	—	156	—	156
Physical science technicians	8,969	5,570	30	102	704	746	3,235	128	624	1	3,399	310	3,089
Biological, medical, dental, and related science technicians	25,445	13,143	—	—	4,622	756	6,276	897	582	10	12,302	6	12,296
Industrial engineering technicians and related specialists	6,901	3,105	54	224	89	198	1,693	54	757	36	3,796	345	3,451
Civil engineering and construction technicians and specialists	13,464	3,662	386	245	325	156	1,547	27	892	84	9,802	361	9,441
Sales and service technicians	1,932	1,039	69	336	177	164	204	24	46	19	893	54	839
Technical writing and illustration specialists	3,034	1,969	316	161	409	191	558	22	290	22	1,065	146	919
Safety and sanitation inspectors and related specialists	4,084	596	—	39	141	202	181	—	33	—	3,488	2	3,486
Product testing and inspection specialists	8,059	334	2	7	52	14	137	25	34	63	7,725	1,599	6,126
Data-processing systems analysis and programming specialists	6,153	4,191	241	2	2,987	543	188	9	221	—	1,962	17	1,945
Airway tower specialists and flight dispatchers	1,373	31	—	—	—	—	13	—	—	18	1,342	192	1,150
Broadcasting, motion picture, and recording studio specialists	2,920	1,820	20	—	1	25	348	1,385	41	—	1,100	132	968

Table 36. EDUCATION EMPLOYERS REQUIRE IN EACH TECHNICAL OCCUPATION GROUP

B. Percent Distribution of Persons in Technical Occupations

Technical occupation group	All levels	Post-high-school									High school		
		Total	Engineering college		College, general		Technical institute		Type not specified	Apprenticeship or armed forces school	Total	Technical or vocational	Other and not specified
			Graduation	Less than graduation	Graduation	Less than graduation	Graduation	Less than graduation					
All technical occupations	100.0	46.8	1.5	2.4	6.5	2.9	20.8	2.5	7.1	3.1	53.2	7.7	45.5
Draftsmen	100.0	40.0	3.1	4.0	0.1	1.0	15.7	2.0	10.6	3.5	60.0	11.2	48.8
Structural design technicians and related specialists	100.0	56.4	8.3	18.7	—	3.2	11.9	1.2	9.4	3.7	43.6	12.6	31.0
Electro and mechanical engineering technicians	100.0	56.2	0.5	2.8	0.2	1.5	30.3	1.8	10.7	8.4	43.8	13.2	30.6
Mathematics technicians	100.0	81.2	0.5	1.8	12.8	46.2	12.3	—	7.6	—	18.8	—	18.8
Physical science technicians	100.0	62.1	0.3	1.2	7.8	8.4	36.0	1.4	7.0	*	37.9	3.5	34.4
Biological, medical, dental, and related science technicians	100.0	51.7	—	—	18.2	3.0	24.7	3.5	2.3	*	48.3	*	48.3
Industrial engineering technicians and related specialists	100.0	45.0	0.8	3.2	1.3	2.9	24.5	0.8	11.0	0.5	55.0	5.0	50.0
Civil engineering and construction technicians and specialists	100.0	27.2	2.9	1.8	2.4	1.2	11.5	0.2	6.6	0.6	72.8	2.7	70.1
Sales and service technicians	100.0	53.8	3.6	17.3	9.2	8.5	10.6	1.2	2.4	1.0	46.2	2.8	43.4
Technical writing and illustration specialists	100.0	64.9	10.4	5.3	13.5	6.3	18.4	0.7	9.6	0.7	35.1	4.8	30.3
Safety and sanitation inspectors and related specialists	100.0	14.6	—	1.0	3.5	4.9	4.4	—	0.8	—	85.4	*	85.4
Product testing and inspection specialists	100.0	4.1	*	0.1	0.6	0.2	1.7	0.3	0.4	0.8	95.9	19.8	76.1
Data-processing systems analysis and programming specialists	100.0	68.1	3.9	*	48.6	8.8	3.1	0.1	3.6	—	31.9	0.3	31.6
Airway tower specialists and flight dispatchers	100.0	2.3	—	—	—	—	0.9	—	—	1.4	97.7	14.0	83.7
Broadcasting, motion picture, and recording studio specialists	100.0	62.3	0.7	—	*	0.9	11.9	47.4	1.4	—	37.7	4.5	33.2

* Less than 0.05 of a percent.

Table 37. EDUCATION EMPLOYERS PREFER IN EACH TECHNICAL OCCUPATION GROUP

A. Number in technical occupations

Technical occupation group	All levels	Post-high-school									High school		
		Total	Engineering college		College, general		Technical institute		Type not specified	Apprenticeship or armed forces school	Total	Technical or vocational	Other and not specified
			Graduation	Less than graduation	Graduation	Less than graduation	Graduation	Less than graduation					
All technical occupations	148,684	97,217	8,900	3,487	15,338	5,778	46,289	2,816	10,148	4,461	51,467	8,197	43,270
Draftsmen	20,972	13,688	1,831	1,094	260	610	6,821	539	1,851	682	7,284	1,522	5,762
Structural design technicians and related specialists	2,516	2,284	822	270	206	258	511	4	123	90	232	62	170
Electro and mechanical engineering technicians	42,031	32,332	1,511	1,267	324	1,065	19,617	642	4,470	3,436	9,699	3,856	5,843
Mathematics technicians	831	696	27	—	304	205	98	—	62	—	135	—	135
Physical science technicians	8,969	7,149	214	114	974	1,042	4,184	97	523	1	1,820	171	1,649
Biological, medical, dental, and related science technicians	25,445	16,428	2	3	6,482	1,115	7,159	625	1,018	24	9,017	131	8,886
Industrial engineering technicians and related specialists	6,901	4,069	548	256	248	258	1,840	45	849	25	2,832	299	2,533
Civil engineering and construction technicians and specialists	13,464	5,963	2,133	282	599	171	2,274	57	371	76	7,501	375	7,126
Sales and service technicians	1,932	1,699	607	8	367	64	295	258	81	19	233	16	217
Technical writing and illustration specialists	3,034	2,601	777	134	505	170	540	11	447	17	433	60	373
Safety and sanitation inspectors and related specialists	4,084	1,208	51	43	697	195	185	4	33	—	2,876	1	2,875
Product testing and inspection specialists	8,059	1,800	19	11	128	238	1,027	128	158	91	6,259	1,343	4,916
Data-processing systems analysis and programming specialists	6,153	5,104	324	2	4,184	347	121	6	120	—	1,049	13	1,036
Airway tower specialists and flight dispatchers	1,373	58	—	—	9	—	22	27	—	—	1,315	192	1,123
Broadcasting, motion picture, and recording studio specialists	2,920	2,138	34	3	51	40	1,595	373	42	—	782	156	626

Table 37. EDUCATION EMPLOYERS PREFER IN EACH TECHNICAL OCCUPATION GROUP

B. Percent Distribution of Persons in Technical Occupations

Technical occupation group	All levels	Post-high-school									High school		
		Total	Engineering college		College, general		Technical institute		Type not specified	Apprenticeship or armed forces school	Total	Technical or vocational	Other and not specified
			Graduation	Less than graduation	Graduation	Less than graduation	Graduation	Less than graduation					
All technical occupations	100.0	65.4	6.0	2.3	10.4	3.9	31.1	1.9	6.8	3.0	34.6	5.5	29.1
Draftsmen	100.0	65.3	8.7	5.2	1.2	2.9	32.6	2.6	8.8	3.3	34.7	7.3	27.4
Structural design technicians and related specialists	100.0	90.8	32.6	10.7	8.2	10.3	20.3	0.2	4.9	3.6	9.2	2.5	6.7
Electro and mechanical engineering technicians	100.0	76.9	3.6	3.0	0.8	2.5	46.7	1.5	10.6	8.2	23.1	9.2	13.9
Mathematics technicians	100.0	83.8	3.2	—	36.6	24.7	11.8	—	7.5	—	16.2	—	16.2
Physical science technicians	100.0	79.7	2.4	1.3	10.9	11.6	46.6	1.1	5.8	*	20.3	1.9	18.4
Biological, medical, dental, and related science technicians	100.0	64.6	*	*	25.5	4.4	28.1	2.5	4.0	0.1	35.4	0.5	34.9
Industrial engineering technicians and related specialists	100.0	59.0	7.9	3.7	3.6	3.7	26.7	0.7	12.3	0.4	41.0	4.3	36.7
Civil engineering and construction technicians and specialists	100.0	44.3	15.8	2.1	4.4	1.3	16.9	0.4	2.8	0.6	55.7	2.8	52.9
Sales and service technicians	100.0	87.9	31.3	0.4	19.0	3.3	15.3	13.4	4.2	1.0	12.1	0.8	11.3
Technical writing and illustration specialists	100.0	85.7	25.6	4.4	16.6	5.6	17.8	0.4	14.7	0.6	14.3	2.0	12.3
Safety and sanitation inspectors and related specialists	100.0	29.6	1.2	1.1	17.1	4.8	4.5	0.1	0.8	—	70.4	*	70.4
Product testing and inspection specialists	100.0	22.3	0.2	0.1	1.6	3.0	12.7	1.6	2.0	1.1	77.7	16.7	61.0
Data-processing systems analysis and programming specialists	100.0	83.0	5.3	*	68.0	5.6	2.0	0.1	2.0	—	17.0	0.2	16.8
Airway tower specialists and flight dispatchers	100.0	4.2	—	—	0.7	—	1.6	1.9	—	—	95.8	14.0	81.8
Broadcasting, motion picture, and recording studio specialists	100.0	73.2	1.2	0.1	1.7	1.4	54.6	12.8	1.4	—	26.8	5.3	21.5

* Less than 0.05 of a percent.

Table 38. YEARS OF EXPERIENCE EMPLOYERS REQUIRE IN EACH TECHNICAL OCCUPATION GROUP

Technical occupation group	Total	No experience	Under 1 year	1 and under 2	2 and under 3	3 and under 4	4 and under 5	5 and under 7	7 and under 10	10 and over
A. Percent distribution of persons in technical occupations										
All technical occupations	100.0	26.5	3.4	10.6	15.0	10.8	8.1	16.9	4.6	4.1
Draftsmen	100.0	31.1	2.0	10.4	17.9	12.2	8.8	10.9	3.5	3.2
Structural design technicians and related specialists	100.0	13.8	0.4	1.9	4.2	2.9	8.5	26.1	24.8	17.4
Electro and mechanical engineering technicians	100.0	18.1	3.7	9.7	13.7	10.9	9.7	23.2	6.0	5.0
Mathematics technicians	100.0	54.1	0.5	17.4	8.2	6.5	4.7	7.1	1.0	0.5
Physical science technicians	100.0	28.6	6.1	10.9	16.2	15.2	8.3	10.1	3.4	1.2
Biological, medical, dental, and related science technicians	100.0	49.2	4.4	16.5	13.0	7.0	3.4	4.5	1.0	1.0
Industrial engineering technicians and related specialists	100.0	13.2	1.6	8.9	12.5	14.3	9.9	27.1	7.5	5.0
Civil engineering and construction technicians and specialists	100.0	19.5	0.5	3.5	11.9	10.3	10.6	23.1	7.5	13.1
Sales and service technicians	100.0	29.2	1.7	5.0	8.4	29.0	6.4	15.4	3.7	1.2
Technical writing and illustration specialists	100.0	13.6	3.3	10.8	26.5	13.0	12.9	16.4	1.5	2.0
Safety and sanitation inspectors and related specialists	100.0	17.6	—	3.6	9.6	11.4	11.0	39.6	4.4	2.8
Product testing and inspection specialists	100.0	24.1	9.1	16.9	14.9	12.3	4.6	15.3	1.2	1.6
Data-processing systems analysis and programming specialists	100.0	28.3	4.0	11.4	18.8	11.2	6.4	14.9	2.4	2.6
Airway tower specialists and flight dispatchers	100.0	1.7	0.4	1.2	11.4	4.5	26.1	36.7	17.9	0.1
Broadcasting, motion picture, and recording studio specialists	100.0	13.4	3.2	11.0	50.4	5.7	3.0	10.8	1.7	0.8
B. Percent distribution of technical-occupation jobs[a]										
All technical occupations	100.0	32.1	2.6	11.5	13.2	10.3	6.7	14.1	4.6	4.9
Draftsmen	100.0	33.6	1.7	10.9	17.3	11.9	6.3	9.5	4.8	4.0
Structural design technicians and related specialists	100.0	18.8	0.6	4.1	6.2	3.8	7.9	25.0	16.2	17.4
Electro and mechanical engineering technicians	100.0	17.6	1.6	7.9	11.7	13.3	10.3	22.2	7.6	7.8
Mathematics technicians	100.0	40.4	1.2	15.6	14.4	5.2	9.8	11.6	0.6	1.2
Physical science technicians	100.0	36.6	2.6	10.4	16.7	13.7	6.6	9.7	2.1	1.6
Biological, medical, dental, and related science technicians	100.0	52.1	4.1	16.8	10.9	6.0	2.7	5.2	1.0	1.2
Industrial engineering technicians and related specialists	100.0	17.0	1.7	8.9	11.8	11.1	10.5	24.4	8.1	6.5
Civil engineering and construction technicians and specialists	100.0	17.1	1.1	3.8	10.9	12.4	8.7	24.5	7.7	13.8
Sales and service technicians	100.0	23.7	1.1	6.6	10.0	21.3	7.2	21.3	6.2	2.6
Technical writing and illustration specialists	100.0	15.3	2.0	11.0	19.2	10.7	15.8	21.4	2.8	1.8
Safety and sanitation inspectors and related specialists	100.0	12.4	—	9.4	15.9	6.3	10.5	24.0	10.8	10.7
Product testing and inspection specialists	100.0	31.0	5.2	15.3	18.2	10.6	4.8	10.7	1.9	2.3
Data-processing systems analysis and programming specialists	100.0	17.7	3.4	10.7	13.7	14.3	8.6	21.7	3.8	6.1
Airway tower specialists and flight dispatchers	100.0	0.9	0.4	1.3	5.8	8.1	17.0	22.9	42.7	0.9
Broadcasting, motion picture, and recording studio specialists	100.0	15.0	3.1	16.0	26.9	13.0	6.6	15.0	2.2	2.2

[a] Each grade within each technical occupation is counted as a separate job for this purpose, a single-grade occupation being counted just once in a given establishment. There were 37,731 such jobs (occupation-grade units) in the 14,595 establishments having technical occupations.

Table 39. PERCENT OF WORKERS IN EACH TECHNICAL OCCUPATION GROUP FOR WHOM EMPLOYERS REQUIRE NO EXPERIENCE, BY GRADE AND REQUIRED EDUCATION

Technical occupation group	All grades			Supervisory grades			Nonsupervisory grades											
							Single grade only[b]			Multi-grade								
										Lowest grades			Middle grades			Highest grades		
	Total	Post-high-school	High school	Total	Post-high-school	High school	Total	Post-high-school	High school	Total	Post-high-school	High school	Total	Post-high-school	High school	Total	Post-high-school	High school
All technical occupations	26.5	37.4	16.8	2.2	4.9	0.0	37.4	52.6	23.2	27.9	42.3	19.7	4.9	6.6	3.0	4.7	7.7	1.6
Draftsmen	31.1	40.5	24.7	0.6	1.3	0.0	43.4	60.2	32.1	46.7	52.5	44.2	4.1	6.9	1.9	5.1	10.6	0.7
Structural design technicians and related specialists	13.8	21.0	4.4	0.0	0.0	0.0	34.7	61.8	4.8	4.7	0.0	8.5	0.0	0.0	0.0	1.0	0.0	2.4
Electro and mechanical engineering technicians	18.1	27.8	5.7	0.3	0.7	0.0	26.6	42.0	7.3	18.0	29.6	8.2	1.3	1.7	0.4	2.4	3.7	[a]
Mathematics technicians	54.1	58.4	35.9	0.0	0.0	0.0	68.3	69.0	50.0	72.9	94.1	59.0	0.0	0.0	0.0	8.8	12.2	0.0
Physical science technicians	28.6	32.3	22.9	2.1	3.4	0.0	51.6	58.7	36.2	23.4	25.6	22.1	2.0	0.2	7.2	10.0	11.6	5.5
Biological, medical, dental, and related science technicians	49.2	62.2	35.4	7.9	11.9	0.0	60.2	73.1	46.8	42.6	74.7	15.8	26.0	39.5	2.3	8.9	13.2	4.2
Industrial engineering technicians and related specialists	13.2	21.9	6.1	2.7	8.3	0.0	20.2	38.8	7.0	12.7	9.4	16.9	2.7	0.0	5.4	1.2	2.2	0.0
Civil engineering and construction technicians and specialists	19.5	46.6	9.4	1.6	14.0	0.0	23.5	46.8	11.6	20.5	77.7	9.9	7.4	0.0	8.7	12.6	41.0	3.9
Sales and service technicians	29.2	53.7	1.0	0.0	0.0	0.0	33.2	58.7	1.2	4.5	8.3	0.0	0.0	0.0	—	0.0	0.0	0.0
Technical writing and illustration specialists	13.6	19.2	3.4	0.0	0.0	0.0	15.0	24.7	2.1	33.0	44.7	10.8	0.9	0.0	3.2	0.8	1.1	0.0
Safety and sanitation inspectors and related specialists	17.6	38.1	14.0	0.0	0.0	0.0	24.2	68.8	7.5	24.9	9.3	25.8	0.0	0.0	0.0	0.0	0.0	0.0
Product testing and inspection specialists	24.1	44.9	23.3	0.3	1.7	0.0	35.1	75.2	33.8	25.7	83.8	24.4	0.3	5.3	0.2	3.7	20.0	2.5
Data-processing systems analysis and programming specialists	28.3	35.8	12.5	0.8	1.3	0.0	39.5	47.7	20.2	49.4	64.5	18.3	0.0	0.0	0.0	3.7	4.7	0.7
Airway tower specialists and flight dispatchers	1.7	77.4	0.0	0.0	0.0	0.0	18.2	100.0	0.0	0.0	0.0	0.0	0.0	—	0.0	0.0	0.0	0.0
Broadcasting, motion picture, and recording studio specialists	13.4	11.3	17.0	9.5	14.6	0.0	17.8	14.4	22.9	0.0	0.0	0.0	0.0	—	0.0	0.0	0.0	0 0

[a] Less than 0.05 of a percent.
[b] Includes workers in establishments that did not report a grading system.

Table 40. REQUIREMENT OF POST-HIGH-SCHOOL EDUCATION IN EACH TECHNICAL OCCUPATION, BY GRADE

Technical occupation group	All grades	Supervisory grades	Nonsupervisory grades			
			Single grade only[b]	Multi-grade		
				Lowest grades	Middle grades	Highest grades
A. Percent of persons in technical occupations whose employers require education beyond high school						
All technical occupations	46.8	44.4	48.1	36.1	52.8	50.9
Draftsmen	40.0	42.7	40.2	29.8	43.6	45.0
Structural design technicians and related specialists	56.4	44.0	52.4	45.1	90.3	59.3
Electro and mechanical engineering technicians	56.2	41.8	55.7	45.9	69.0	65.2
Mathematics technicians	81.2	95.7	96.1	39.5	52.9	71.9
Physical science technicians	62.1	63.5	68.3	37.2	73.6	73.5
Biological, medical, dental, and related science technicians	51.7	66.5	50.9	45.5	63.8	52.6
Industrial engineering technicians and related specialists	45.0	32.7	41.4	56.0	49.7	53.8
Civil engineering and construction technicians and specialists	27.2	11.6	34.0	15.6	14.5	23.3
Sales and service technicians	53.8	54.3	55.6	54.1	[a]	11.7
Technical writing and illustration specialists	64.9	87.5	56.9	65.5	70.6	75.4
Safety and sanitation inspectors and related specialists	14.6	12.3	27.3	5.5	19.3	15.6
Product testing and inspection specialists	4.1	16.4	3.1	2.3	3.1	6.9
Data-processing systems analysis and programming specialists	68.1	57.5	70.0	67.5	60.8	73.5
Airway tower specialists and flight dispatchers	2.3	2.1	18.2	0.6	0.0	0.2
Broadcasting, motion picture, and recording studio specialists	62.3	65.2	59.5	76.2	[a]	47.4
B. Percent of technical occupation jobs[c] that require education beyond high school						
All technical occupations	45.9	49.0	45.3	39.2	49.1	49.9
Draftsmen	39.0	46.2	38.8	29.9	41.1	45.4
Structural design technicians and related specialists	57.1	60.0	62.2	40.0	73.3	50.9
Electro and mechanical engineering technicians	53.7	42.4	52.6	52.3	71.6	61.8
Mathematics technicians	63.0	94.7	93.2	23.8	26.1	43.8
Physical science technicians	64.5	71.7	67.4	45.6	67.8	70.3
Biological, medical, dental, and related science technicians	51.7	67.2	50.9	43.2	50.8	53.4
Industrial engineering technicians and related specialists	44.8	46.9	45.5	45.0	20.9	49.5
Civil engineering and construction technicians and specialists	31.8	19.1	33.0	25.2	33.6	32.9
Sales and service technicians	56.5	52.9	60.9	45.2	[a]	10.0
Technical writing and illustration specialists	67.9	80.7	66.1	62.7	62.1	70.1
Safety and sanitation inspectors and related specialists	21.7	11.2	26.9	20.1	39.5	10.9
Product testing and inspection specialists	8.8	22.9	6.6	4.9	8.1	12.7
Data-processing systems analysis and programming specialists	59.0	59.1	58.8	58.6	58.7	60.3
Airway tower specialists and flight dispatchers	3.1	2.9	18.2	2.5	0.0	2.4
Broadcasting, motion picture, and recording studio specialists	38.8	43.1	35.5	48.3	[a]	53.6

[a] Not computed because of small number involved.
[b] Includes workers and jobs in establishments that did not report a grading system.
[c] Each grade within each technical occupation is counted as a separate job for this purpose, a single-grade occupation being counted just once in a given establishment. There were 37,731 such jobs (occupation-grade units) in the 14,595 establishments having technical occupations.

Table 41. REQUIREMENT OF POST-HIGH-SCHOOL EDUCATION IN EACH TECHNICAL OCCUPATION GROUP, BY AREA

(Percent of persons in technical occupations whose employers require education beyond high school)

Technical occupation group	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
All technical occupations	46.8	45.0	46.5	36.2	50.9	64.0	46.3	48.7	55.3	52.9	47.4
Draftsmen	40.0	42.3	26.1	34.1	50.6	56.1	36.4	30.1	58.0	66.5	37.0
Structural design technicians and related specialists	56.4	50.9	69.1	66.0	91.1	60.0	74.5	60.0	74.0	—	24.2
Electro and mechanical engineering technicians	56.2	39.7	61.1	39.4	75.7	84.1	54.1	63.8	71.5	69.4	69.2
Mathematics technicians	81.2	92.3	73.0	100.0	94.9	100.0	100.0	87.5	68.0	—	83.3
Physical science technicians	62.1	70.4	46.6	61.1	75.6	70.9	63.3	53.8	77.7	60.9	50.8
Biological, medical, dental, and related science technicians	51.7	55.5	47.6	53.4	34.0	61.9	44.6	49.5	47.1	41.0	48.2
Industrial engineering technicians and related specialists	45.0	26.6	78.6	31.3	28.4	56.2	37.5	60.5	29.7	59.1	43.1
Civil engineering and construction technicians and specialists	27.2	32.5	11.1	16.4	22.8	4.0	38.3	28.4	31.2	28.4	25.0
Sales and service technicians	53.8	60.5	37.0	36.2	88.2	10.0	55.6	38.8	56.2	100.0	54.6
Technical writing and illustration specialists	64.9	63.2	58.2	60.0	76.4	71.9	80.8	87.1	83.3	64.1	75.7
Safety and sanitation inspectors and related specialists	14.6	7.5	9.0	46.7	18.1	14.8	21.3	20.9	18.0	4.3	36.9
Product testing and inspection specialists	4.1	4.7	3.4	0.5	11.3	5.1	5.0	0.6	2.8	22.4	3.2
Data-processing systems analysis and programming specialists	68.1	61.7	73.1	58.6	73.4	99.2	90.7	84.1	93.2	32.5	87.7
Airway tower specialists and flight dispatchers	2.3	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	16.4	0.0
Broadcasting, motion picture, and recording studio specialists	62.3	70.2	33.3	0.0	30.5	0.0	69.2	18.8	23.4	0.0	34.4

Table 42. REQUIREMENT OF POST-HIGH-SCHOOL EDUCATION IN EACH TECHNICAL OCCUPATION GROUP, BY INDUSTRY DIVISION

(Percent of persons in technical occupations whose employers require education beyond high school)

Technical occupation group	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other industries
All technical occupations	46.8	54.7	41.7	32.9	52.3	47.4	67.9	17.6	63.8
Draftsmen	40.0	44.4	26.2	43.0	100.0	42.9	70.1	6.9	28.9
Structural design technicians and related specialists	56.4	76.8	51.4	97.6	—	44.6	100.0	49.2	89.9
Electro and mechanical engineering technicians	56.2	68.6	75.3	18.1	76.9	73.9	69.0	14.5	81.2
Mathematics technicians	81.2	77.0	—	—	100.0	97.9	100.0	0.0	—
Physical science technicians	62.1	59.5	100.0	64.0	100.0	90.7	82.8	33.8	73.4
Biological, medical, dental, and related science technicians	51.7	30.5	—	100.0	52.3	90.7	59.6	45.9	63.6
Industrial engineering technicians and related specialists	45.0	54.5	—	45.8	—	29.6	94.7	0.2	75.7
Civil engineering and construction technicians and specialists	27.2	41.5	43.8	58.3	—	27.4	87.5	1.1	36.0
Sales and service technicians	53.8	47.5	15.1	—	0.0	66.7	—	5.8	65.0
Technical writing and illustration specialists	64.9	71.8	—	97.1	—	42.8	100.0	30.8	60.0
Safety and sanitation inspectors and related specialists	14.6	54.5	25.0	40.0	0.0	77.8	50.0	9.7	20.3
Product testing and inspection specialists	4.1	3.5	0.0	0.0	—	11.8	—	7.1	6.3
Data-processing systems analysis and programming specialists	68.1	75.8	100.0	70.3	45.5	68.2	100.0	23.8	67.2
Airway tower specialists and flight dispatchers	2.3	100.0	—	3.9	—	—	—	0.0	—
Broadcasting, motion picture, and recording studio specialists	62.3	46.7	—	69.0	—	—	100.0	0.0	41.9

[a] Includes architectural as well as engineering service enterprises; research, development, and testing laboratories; and business and management consulting services.

Table 43. MEDIAN YEARS OF EXPERIENCE EMPLOYERS REQUIRE IN EACH TECHNICAL OCCUPATION GROUP, BY GRADE AND REQUIRED EDUCATION

A. Based on Number of Persons in Technical Occupations

Technical occupation group	All grades			Supervisory grades			Nonsupervisory grades											
							Single grade only[b]			Multi-grade								
										Lowest grades			Middle grades			Highest grades		
	Total	Post-high-school	High school	Total	Post-high-school	High school	Total	Post-high-school	High school	Total	Post-high-school	High school	Total	Post-high-school	High school	Total	Post-high-school	High school
All technical occupations	2.6	1.9	3.4	6.2	5.5	6.7	1.9	0.0	2.8	1.9	1.1	2.4	3.4	3.1	3.7	4.7	3.7	5.3
Draftsmen	2.5	1.6	2.8	6.9	6.7	7.5	1.5	0.0	2.4	0.7	0.0	1.1	2.8	2.3	3.3	4.4	3.5	4.7
Structural design technicians and related specialists	6.4	5.6	7.7	10.8	8.7	11.9	5.1	0.0	6.2	4.7	3.9	4.9	7.9	7.9	8.0	8.0	6.5	8.9
Electro and mechanical engineering technicians	3.4	2.6	4.8	6.8	6.2	7.3	2.8	1.6	4.8	2.2	1.6	2.6	4.3	4.2	4.5	5.1	4.2	5.6
Mathematics technicians	0.0	0.0	1.7	5.6	5.5	[a]	0.0	0.0	1.0	0.0	0.0	0.0	2.8	3.4	2.5	5.1	5.7	3.8
Physical science technicians	2.3	1.9	2.7	5.5	5.2	5.8	0.0	0.0	2.4	1.7	1.4	1.9	3.4	3.1	4.4	3.8	3.2	4.8
Biological, medical, dental, and related science technicians	0.2	0.0	1.6	3.7	3.1	5.8	0.0	0.0	0.8	1.0	0.0	1.9	1.9	1.2	3.1	3.4	2.5	4.5
Industrial engineering technicians and related specialists	3.9	3.3	4.9	6.1	6.0	6.1	2.9	1.6	4.1	3.4	3.7	3.1	3.8	3.5	4.4	6.0	5.6	6.2
Civil engineering and construction technicians and specialists	4.4	1.5	5.1	7.2	7.5	7.1	3.9	1.4	5.4	3.6	0.0	4.3	3.9	4.5	3.8	5.6	2.7	6.0
Sales and service technicians	3.2	0.0	4.0	5.0	0.7	6.1	3.1	0.0	3.8	1.9	1.5	5.7	[a]	[a]	—	7.6	[a]	7.9
Technical writing and illustration specialists	2.8	2.6	3.2	5.3	4.9	6.4	2.7	2.3	3.3	1.2	0.6	1.9	3.1	3.0	3.2	5.1	5.1	5.3
Safety and sanitation inspectors and related specialists	4.7	2.1	5.2	6.4	5.8	6.5	3.8	0.0	5.4	4.5	2.5	4.7	2.7	1.6	2.9	5.2	3.6	5.5
Product testing and inspection specialists	1.9	1.1	2.0	6.4	3.9	6.7	1.5	0.0	1.6	10.	0.0	1.1	2.0	1.5	2.1	3.4	2.9	3.4
Data-processing systems analysis and programming specialists	2.3	2.0	3.6	6.0	6.0	6.0	1.5	0.4	2.8	0.1	0.0	2.9	2.5	2.3	3.5	2.9	2.8	4.4
Airway tower specialists and flight dispatchers	5.2	0.0	5.3	8.3	[a]	8.4	2.4	0.0	2.5	4.3	[a]	4.3	4.9	—	4.9	6.1	[a]	6.1
Broadcasting, motion picture, and recording studio specialists	2.4	2.5	2.0	5.4	5.8	3.7	2.3	2.4	1.6	2.5	2.5	2.2	[a]	—	[a]	6.0	6.0	5.9

Table 43. MEDIAN YEARS OF EXPERIENCE EMPLOYERS REQUIRE IN EACH TECHNICAL OCCUPATION GROUP, BY GRADE AND REQUIRED EDUCATION

B. Based on Technical Occupation Jobs[c]

Technical occupation group	All grades			Supervisory grades			Nonsupervisory grades											
							Single grade only[b]			Multi-grade								
										Lowest grades			Middle grades			Highest grades		
	Total	Post-high-school	High school	Total	Post-high-school	High school	Total	Post-high-school	High school	Total	Post-high-school	High school	Total	Post-high-school	High school	Total	Post-high-school	High school
All technical occupations	2.3	1.4	2.9	5.9	5.3	6.4	1.4	0.0	2.3	1.6	0.9	2.1	3.1	2.7	3.7	4.1	3.3	4.9
Draftsmen	2.2	1.2	2.7	6.7	7.4	6.4	1.7	0.0	2.4	0.8	0.0	1.2	2.9	2.4	3.3	4.1	3.3	4.7
Structural design technicians and related specialists	5.7	4.4	7.2	10.1	9.1	10.9	4.2	0.0	6.3	4.7	3.0	5.3	6.1	5.8	[a]	7.7	6.4	8.7
Electro and mechanical engineering technicians	3.8	3.1	4.9	6.7	6.3	6.9	3.1	1.7	4.5	2.4	1.8	2.7	4.2	4.1	4.3	5.3	4.8	5.7
Mathematics technicians	1.5	1.0	1.9	5.6	5.6	[a]	0.0	0.0	[a]	0.0	0.0	0.5	2.5	[a]	2.5	3.6	[a]	[a]
Physical science technicians	2.0	1.6	2.5	5.4	5.0	6.0	0.0	0.0	2.2	1.3	1.3	1.5	3.2	3.0	3.9	3.5	3.1	4.4
Biological, medical, dental, and related science technicians	0.0	0.0	1.2	3.9	3.3	5.7	0.0	0.0	0.0	1.1	0.0	1.9	2.3	1.6	2.8	3.3	2.5	3.9
Industrial engineering technicians and related specialists	3.9	2.8	4.9	6.1	5.3	6.5	3.3	2.1	4.5	2.5	1.8	2.9	4.2	3.1	4.5	5.5	4.5	5.8
Civil engineering and construction technicians and specialists	4.5	2.3	5.5	7.2	4.8	7.5	4.4	1.8	5.5	3.0	0.1	3.8	4.3	4.5	4.0	5.8	2.8	6.5
Sales and service technicians	3.4	1.9	5.4	5.7	[a]	[a]	3.2	2.1	4.6	4.5	1.5	5.8	[a]	[a]	—	7.4	[a]	7.7
Technical writing and illustration specialists	3.2	2.9	3.9	5.8	5.6	6.3	2.7	2.3	3.7	1.5	0.9	2.4	3.4	3.3	3.8	4.8	4.6	5.1
Safety and sanitation inspectors and related specialists	4.6	2.2	5.3	6.9	5.5	7.0	3.8	1.6	5.1	2.9	2.4	3.9	2.1	1.5	4.2	5.8	4.4	6.0
Product testing and inspection specialists	1.9	0.0	1.9	5.9	3.9	6.1	1.3	0.0	1.4	0.5	0.0	0.6	2.0	[a]	2.2	2.9	2.1	3.2
Data-processing systems analysis and programming specialists	3.3	2.8	3.9	5.9	5.9	6.0	2.3	1.6	3.2	1.5	0.0	2.6	2.6	2.3	4.5	3.7	3.3	4.7
Airway tower specialists and flight dispatchers	6.4	[a]	6.6	8.4	[a]	8.5	2.4	[a]	[a]	3.9	[a]	3.9	4.9	—	4.9	5.9	[a]	6.0
Broadcasting, motion picture, and recording studio specialists	2.6	2.7	2.4	3.7	5.0	3.6	2.1	2.5	1.7	2.6	2.6	2.5	[a]	—	[a]	6.2	6.0	6.8

[a] Not computed because of small number involved.
[b] Includes workers and jobs in establishments that did not report a grading system.
[c] Each grade within each technical occupation is counted as a separate job for this purpose, a single-grade occupation being counted just once in a given establishment. There were 37,731 such jobs (occupation-grade units) in the 14,595 establishments having technical occupations.

Table 44. EMPLOYER'S PREFERENCE FOR MORE THAN REQUIRED EDUCATION AS AGAINST MORE EXPERIENCE, BY TECHNICAL OCCUPATION GROUP

A. Number in Technical Occupations

Technical occupation group	Total	No preference expressed	Preference where one was expressed				
			All preferences	Required education, more experience	More than required education		
					Less experience	Same experience	More experience
All technical occupations	148,684	98,172	50,512	6,686	22,268	17,012	4,546
Draftsmen	20,972	11,983	8,989	1,485	3,218	3,122	1,164
Structural design technicians and related specialists	2,516	873	1,643	153	741	463	286
Electro and mechanical engineering technicians	42,031	28,745	13,286	1,625	7,943	3,149	569
Mathematics technicians	831	505	326	14	12	288	12
Physical science technicians	8,969	5,986	2,983	397	1,121	1,089	376
Biological, medical, dental, and related science technicians	25,445	18,153	7,292	1,690	2,355	2,568	679
Industrial engineering technicians and related specialists	6,901	5,172	1,729	115	964	549	101
Civil engineering and construction technicians and specialists	13,464	8,612	4,852	359	2,494	1,507	492
Sales and service technicians	1,932	601	1,331	62	633	587	49
Technical writing and illustration specialists	3,034	1,658	1,376	158	734	319	165
Safety and sanitation inspectors and related specialists	4,084	3,170	914	10	647	219	38
Product testing and inspection specialists	8,059	5,897	2,162	297	756	883	226
Data-processing systems analysis and programming specialists	6,153	4,297	1,856	206	599	881	170
Airway tower specialists and flight dispatchers	1,373	1,319	54	—	—	54	—
Broadcasting, motion picture, and recording studio specialists	2,920	1,201	1,719	115	51	1,334	219

Table 44. EMPLOYER'S PREFERENCE FOR MORE THAN REQUIRED EDUCATION AS AGAINST MORE EXPERIENCE, BY TECHNICAL OCCUPATION GROUP

B. Percent Distribution of Persons in Technical Occupations

Technical occupation group	Total	No preference expressed	Preference where one was expressed				
			All preferences	Required education, more experience	More than required education		
					Less experience	Same experience	More experience
All technical occupations	100.0	66.0	34.0	4.5	15.0	11.4	3.1
Draftsmen	100.0	57.1	42.9	7.1	15.3	14.9	5.6
Structural design technicians and related specialists	100.0	34.7	65.3	6.1	29.4	18.4	11.4
Electro and mechanical engineering technicians	100.0	68.4	31.6	3.9	18.8	7.5	1.4
Mathematics technicians	100.0	60.8	39.2	1.7	1.4	34.7	1.4
Physical science technicians	100.0	66.7	33.3	4.4	12.5	12.2	4.2
Biological, medical, dental, and related science technicians	100.0	71.3	28.7	6.6	9.3	10.1	2.7
Industrial engineering technicians and related specialists	100.0	74.9	25.1	1.7	13.9	8.0	1.5
Civil engineering and construction technicians and specialists	100.0	64.0	36.0	2.7	18.4	11.2	3.7
Sales and service technicians	100.0	31.1	68.9	3.2	32.8	30.4	2.5
Technical writing and illustration specialists	100.0	54.6	45.4	5.2	24.3	10.5	5.4
Safety and sanitation inspectors and related specialists	100.0	77.6	22.4	0.2	15.9	5.4	0.9
Product testing and inspection specialists	100.0	73.2	26.8	3.7	9.4	10.9	2.8
Data-processing systems analysis and programming specialists	100.0	69.8	30.2	3.3	9.7	14.4	2.8
Airway tower specialists and flight dispatchers	100.0	96.1	3.9	—	—	3.9	—
Broadcasting, motion picture, and recording studio specialists	100.0	41.1	58.9	3.9	1.7	45.8	7.5

Table 45. LICENSES AND TESTS REQUIRED BY EMPLOYERS, BY TECHNICAL OCCUPATION GROUP

A. Number in Technical Occupations

Technical occupation group	Total	None	Government license or permit[a]	Professional society accreditation	Civil service examination	Company formal test
All technical occupations	148,684	110,542	7,494	933	12,254	17,461
Draftsmen	20,972	19,362	65	—	826	719
Structural design technicians and related specialists	2,516	2,509	—	—	7	—
Electro and mechanical engineering technicians	42,031	27,959	768	—	1,005	12,299
Mathematics technicians	831	815	—	—	—	16
Physical science technicians	8,969	8,361	193	—	88	327
Biological, medical, dental, and related science technicians	25,445	19,242	2,724	933	2,538	8
Industrial engineering technicians and related specialists	6,901	6,260	8	—	101	532
Civil engineering and construction technicians and specialists	13,464	8,866	351	—	4,238	9
Sales and service technicians	1,932	1,769	—	—	44	119
Technical writing and illustration specialists	3,034	2,781	—	—	22	231
Safety and sanitation inspectors and related specialists	4,084	678	608	—	2,737	61
Product testing and inspection specialists	8,059	6,810	328	—	423	498
Data-processing systems analysis and programming specialists	6,153	3,296	—	—	217	2,640
Airway tower specialists and flight dispatchers	1,373	—	1,373	—	—	—
Broadcasting, motion picture, and recording studio specialists	2,920	1,834	1,076	—	8	2

Table 45. LICENSES AND TESTS REQUIRED BY EMPLOYERS, BY TECHNICAL OCCUPATION GROUP

B. Percent Distribution of Persons in Technical Occupations

Technical occupation group	Total	None	Government license or permit[a]	Professional society accreditation	Civil service examination	Company formal test
All technical occupations	100.0	74.5	5.0	0.6	8.2	11.7
Draftsmen	100.0	92.4	0.3	—	3.9	3.4
Structural design technicians and related specialists	100.0	99.7	—	—	0.3	—
Electro and mechanical engineering technicians	100.0	66.5	1.8	—	2.4	29.3
Mathematics technicians	100.0	98.1	—	—	—	1.9
Physical science technicians	100.0	93.2	2.2	—	1.0	3.6
Biological, medical, dental, and related science technicians	100.0	75.6	10.7	3.7	10.0	[b]
Industrial engineering technicians and related specialists	100.0	90.7	0.1	—	1.5	7.7
Civil engineering and construction technicians and specialists	100.0	65.8	2.6	—	31.5	0.1
Sales and service technicians	100.0	91.5	—	—	2.3	6.2
Technical writing and illustration specialists	100.0	91.7	—	—	0.7	7.6
Safety and sanitation inspectors and related specialists	100.0	16.6	14.9	—	67.0	1.5
Product testing and inspection specialists	100.0	84.5	4.1	—	5.2	6.2
Data-processing systems analysis and programming specialists	100.0	53.6	—	—	3.5	42.9
Airway tower specialists and flight dispatchers	100.0	—	100.0	—	—	—
Broadcasting, motion picture, and recording studio specialists	100.0	62.8	36.8	—	0.3	0.1

[a] All cases where there was a requirement in addition to government license or permit are found only under this heading.

[b] Less than 0.05 of a percent.

Table 46. NUMBER OF ENGINEERS, SCIENTISTS, AND TEACHERS OF ENGINEERING, SCIENCE, AND TECHNOLOGY IN EACH DETAILED OCCUPATION, BY INDUSTRY DIVISION

Occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[1]	Private colleges and schools	Government	All other
All engineers, scientists, teachers	142,732	54,563	7,820	4,728	1,836	14,780	16,607	31,894	10,504
Engineers and architects	86,393	43,419	7,758	4,666	15	13,107	12	9,845	7,571
Aeronautical	1,702	1,336	—	43	—	203	—	48	72
Chemical and ceramic	7,271	5,067	761	31	1	870	—	45	496
Chemical	6,998	4,819	761	31	1	846	—	44	496
Ceramic	273	248	—	—	—	24	—	1	—
Civil and construction	16,022	1,146	4,433	372	5	3,534	—	6,082	450
Civil and construction	15,660	1,130	4,433	311	5	3,504	—	5,828	449
Sanitary	204	8	—	2	—	17	—	177	—
Transportation	158	8	—	59	—	13	—	77	1
Electrical and electronic	26,164	16,648	691	3,160	5	2,414	12	1,713	1,521
Industrial	5,443	3,378	31	147	—	632	—	128	1,127
Industrial	4,835	3,331	31	132	—	632	—	95	614
Safety	608	47	—	15	—	—	—	33	513
Mechanical	22,721	13,856	1,709	820	4	2,739	—	1,030	2,563
Air conditioning, heating, and refrigeration	2,069	551	849	17	—	285	—	65	302
Marine engineering and naval architecture	872[a]	121	—	312	—	205	—	106	128
Textile	102	75	—	—	—	17	—	1	9
Optical	104	96	—	—	—	8	—	—	—
Other mechanical	19,574[b]	13,013	860	491	4	2,224	—	858	2,124
Metallurgical	1,065[c]	795	—	1	—	161	—	12	96
Mining and petroleum	166	52	—	3	—	44	—	1	66
Sales	1,264	613	26	47	—	17	—	—	561
Engineers n.e.c.	624[d]	457	—	6	—	20	—	77	64
Architects	3,951[e]	71	107	36	—	2,473	—	709	555
Scientists and mathematicians	21,123	11,144	62	62	1,789	1,673	752	2,757	2,884
Agricultural scientists	490	207	—	—	—	17	—	242	24
Biological scientists	1,771[f]	694	11	—	105	56	158	640	107
Chemists	9,791	6,712	39	48	226	602	221	651	1,292
Food technologists	154	153	—	—	—	1	—	—	—
Other	9,637	6,559	39	48	226	601	221	651	1,292
Geologists and geophysicists	345[g]	63	11	2	—	131	11	50	77
Mathematicians	1,802	1,073	1	12	—	242	197	33	244
Metallurgists	426	314	—	—	—	69	—	25	18
Meteorologists	111	—	—	—	—	—	—	105	6

Continued

Table 46. NUMBER OF ENGINEERS, SCIENTISTS, AND TEACHERS OF ENGINEERING, SCIENCE, AND TECHNOLOGY IN EACH DETAILED OCCUPATION, BY INDUSTRY DIVISION

Occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[1]	Private colleges and schools	Government	All other
Scientists and mathematicians (continued)									
Physicists	2,763	1,663	—	—	40	506	76	276	202
Engineering physicists	300	282	—	—	—	18	—	—	—
Other	2,463[h]	1,381	—	—	40	488	76	276	202
Research pharmacists	290	273	—	—	11	4	—	1	1
Medical scientists	3,114	93	—	—	1,406	7	89	635	884
Pathologists	681	—	—	—	523	—	—	137	5
Radiologists	665	—	—	—	482	1	—	189	9
Other	1,768	93	—	—	401	6	89	309	870
Scientists n.e.c.	220	52	—	—	1	39	—	99	29
College teachers	17,865	—	—	—	32	—	13,594	4,190	49
Engineering and architecture	2,834	—	—	—	—	—	2,344	452	38
Aeronautical	103	—	—	—	—	—	99	—	4
Chemical	215	—	—	—	—	—	186	29	—
Civil and construction	359	—	—	—	—	—	260	99	—
Electrical and electronic	821	—	—	—	—	—	649	138	34
Industrial	144	—	—	—	—	—	122	22	—
Marine engineering	118	—	—	—	—	—	92	26	—
Mechanical	395	—	—	—	—	—	311	84	—
Metallurgical	119	—	—	—	—	—	104	15	—
All other engineering	46	—	—	—	—	—	30	16	—
Architecture, design or theory	514	—	—	—	—	—	491	23	—
Science and mathematics	12,228	—	—	—	32	—	8,966	3,219	11
Agriculture, forestry, horticulture, and architectural landscaping	314	—	—	—	—	—	209	105	—
Biology	1,303	—	—	—	6	—	813	479	5
Chemistry	1,736	—	—	—	21	—	1,210	505	—
Geology, earth science, atmosphere science	280	—	—	—	—	—	176	104	—
Mathematics	1,595	—	—	—	—	—	1,052	542	1
Medical science n.e.c.	4,881	—	—	—	—	—	3,949	932	—
General science (including public health)	141	—	—	—	—	—	110	31	—
Physics and radiology	1,805	—	—	—	5	—	1,384	411	5
Pharmacy, pharmacology	140	—	—	—	—	—	51	89	—
All other	33	—	—	—	—	—	12	21	—

Continued

Table 46. NUMBER OF ENGINEERS, SCIENTISTS, AND TEACHERS OF ENGINEERING, SCIENCE, AND TECHNOLOGY IN EACH DETAILED OCCUPATION, BY INDUSTRY DIVISION

Occupation	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[1]	Private colleges and schools	Government	All other
College teachers (continued)									
Technology	2,803	—	—	—	—	—	2,284	519	—
Airplane dispatching	84	—	—	—	—	—	84	—	—
Mechanical technology	95	—	—	—	—	—	43	52	—
Construction technology	77	—	—	—	—	—	36	41	—
Ceramics	73	—	—	—	—	—	8	65	—
Computer programming	18	—	—	—	—	—	15	3	—
Dental hygiene	90	—	—	—	—	—	15	75	—
Dental laboratory technology	203	—	—	—	—	—	192	11	—
Drafting	626	—	—	—	—	—	576	50	—
Electronic technology	1,036	—	—	—	—	—	935	101	—
Machine design, including industrial design	88	—	—	—	—	—	68	20	—
Medical laboratory technology	158	—	—	—	—	—	108	50	—
Surveying	28	—	—	—	—	—	14	14	—
Industrial production methods	22	—	—	—	—	—	—	22	—
X-ray technology	92	—	—	—	—	—	92	—	—
All other technology	113	—	—	—	—	—	98	15	—
High school teachers (licensed)	17,351	—	—	—	—	—	2,249	15,102	—
Science	8,354	—	—	—	—	—	1,131	7,223	—
Mathematics	8,747	—	—	—	—	—	1,083	7,664	—
Technical and technical-related	250	—	—	—	—	—	35	215	—

[a] Includes 161 persons reported as "naval architects."
[b] Includes 33 persons reported as "tool" and 72 persons as "hydraulic engineers."
[c] Includes 18 persons reported as "welding engineers."
[d] Includes 54 persons reported as "agricultural" and 481 persons as "technical service engineers."
[e] Includes 67 persons reported as "architectural engineers."
[f] Includes 44 persons reported as "pharmacologists."
[g] Includes 18 persons reported as "geological and geophysical engineers."
[h] Includes 106 persons reported as "nuclear engineers."
[i] Includes architectural as well as engineering services enterprises; research, development, and testing laboratories; and business and management consulting services.

Table 47. NUMBER OF ENGINEERS, SCIENTISTS, AND TEACHERS OF ENGINEERING, SCIENCE, AND TECHNOLOGY IN EACH DETAILED OCCUPATION, BY AREA

Occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
All engineers, scientists, teachers	142,732	58,318	18,158	5,593	8,398	2,552	13,576	8,118	7,239	2,766	18,014
Engineers and architects	86,393	35,060	12,843	3,024	5,069	1,797	7,921	5,308	4,709	1,856	8,806
Aeronautical	1,702	213	1,046	—	28	11	348	—	30	13	13
Chemical and ceramic	7,271	2,809	227	252	399	85	1,673	669	230	35	892
Chemical	6,998	2,791	225	251	379	83	1,592	625	209	34	809
Ceramic	273	18	2	1	20	2	81	44	21	1	83
Civil and construction	16,022	9,122	1,150	491	1,234	210	888	577	623	199	1,528
Civil and construction	15,660	9,016	1,129	475	1,142	204	859	564	595	195	1,481
Sanitary	204	31	21	9	69	3	13	6	12	3	37
Transportation	158	75	—	7	23	3	16	7	16	1	10
Electrical and electronic	26,164	8,217	6,223	1,118	1,200	963	1,765	1,188	1,855	908	2,727
Industrial	5,443	1,997	261	158	219	106	543	906	501	121	631
Industrial	4,835	1,726	249	112	185	89	485	869	390	120	610
Safety	608	271	12	46	34	17	58	37	111	1	21
Mechanical	22,721	8,642	3,359	770	1,457	364	2,307	1,785	1,128	499	2,410
Air conditioning, heating, and refrigeration	2,069	1,078	52	273	66	6	122	15	364	5	88
Marine engineering and naval architecture	872[a]	743	14	—	78	2	6	—	12	10	7
Textile	102	44	—	—	41	—	6	7	4	—	—
Optical	104	11	1	8	1	—	—	81	—	—	2
Other mechanical	19,574[b]	6,766	3,292	489	1,271	356	2,173	1,682	748	484	2,313
Metallurgical	1,065[c]	388	126	5	148	3	153	38	57	26	121
Mining and petroleum	166	105	—	—	9	—	7	—	5	1	39
Sales	1,264	585	25	28	73	31	97	50	158	—	217
Engineers n.e.c.	624[d]	494	6	12	50	—	9	15	7	3	28
Architects	3,951[e]	2,488	420	190	252	24	131	80	115	51	200
Scientists and mathematicians	21,123	7,062	1,604	1,378	1,881	362	2,649	1,567	1,108	404	3,108
Agricultural scientists	490	27	19	7	51	—	61	10	99	27	189
Biological scientists	1,771[f]	496	140	117	268	1	53	64	132	1	499
Chemists	9,791	3,199	356	820	773	157	1,819	862	311	47	1,447
Food technologists	154	8	—	101	4	—	—	11	2	—	28
Other	9,637	3,191	356	719	769	157	1,819	851	309	47	1,419
Geologists and geophysicists	345[g]	226	9	10	36	—	13	30	7	1	13
Mathematicians	1,802	360	206	119	163	99	165	95	167	51	377
Metallurgists	426	108	40	5	54	10	79	46	24	10	50
Meteorologists	111	88	6	—	6	1	7	2	1	—	—

Continued

Table 47. NUMBER OF ENGINEERS, SCIENTISTS, AND TEACHERS OF ENGINEERING, SCIENCE, AND TECHNOLOGY IN EACH DETAILED OCCUPATION, BY AREA

Occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
Scientists and mathematicians (continued)											
Physicists	2,763	418	542	30	395	77	204	352	288	249	208
Engineering physicists	300	—	241	—	25	5	—	4	12	8	5
Other	2,463[h]	418	301	30	370	72	204	348	276	241	203
Research pharmacists	290	25	1	176	30	—	—	4	15	—	39
Medical scientists	3,114	2,016	273	93	51	16	247	102	35	18	263
Pathologists	681	422	53	28	18	6	37	7	8	8	94
Radiologists	665	405	57	22	19	8	27	10	7	8	102
Other	1,768	1,189	163	43	14	2	183	85	20	2	67
Scientists n.e.c.	220	99	12	1	54	1	1	—	29	—	23
College teachers	17,865	10,977	723	111	644	101	1,334	555	716	94	2,610
Engineering and architecture	2,834	1,712	110	2	215	21	144	29	139	40	422
Aeronautical	103	78	—	—	15	—	—	—	—	—	10
Chemical	215	139	—	—	12	—	13	10	8	3	30
Civil and construction	359	180	—	—	39	2	36	—	14	9	79
Electrical and electronic	821	518	2	—	50	11	35	11	78	10	106
Industrial	144	59	—	—	16	—	18	—	7	4	40
Marine engineering	118	27	91	—	—	—	—	—	—	—	—
Mechanical	395	229	2	2	21	8	32	8	11	9	73
Metallurgical	119	43	—	—	31	—	10	—	—	5	30
All other engineering	46	18	13	—	7	—	—	—	5	—	3
Architecture, design or theory	514	421	2	—	24	—	—	—	16	—	51
Science and mathematics	12,228	7,562	334	95	354	51	675	505	524	35	2,093
Agriculture, forestry, horticulture, and architectural landscaping	314	—	19	—	—	—	—	—	38	—	257
Biology	1,303	635	74	16	56	11	55	48	91	4	313
Chemistry	1,736	811	57	16	61	15	95	37	80	10	554
Geology, earth science, atmosphere science	280	170	7	—	28	4	8	9	11	2	41
Mathematics	1,595	928	98	30	69	12	61	47	61	11	278
Medical science n.e.c.	4,881	3,958	—	—	28	—	290	281	191	—	133
General science (including public health)	141	80	1	20	4	—	10	9	2	—	15
Physics and radiology	1,805	914	78	13	90	9	79	74	38	8	502
Pharmacy, pharmacology	140	33	—	—	18	—	77	—	12	—	—
All other	33	33	—	—	—	—	—	—	—	—	—

Continued

Table 47. NUMBER OF ENGINEERS, SCIENTISTS, AND TEACHERS OF ENGINEERING, SCIENCE, AND TECHNOLOGY IN EACH DETAILED OCCUPATION, BY AREA

Occupation	New York State	New York City	Nassau-Suffolk	West-chester	Albany	Bing-hamton	Buffalo	Roch-ester	Syracuse	Utica	All other
College teachers (continued)											
Technology	2,803	1,703	279	14	75	29	515	21	53	19	95
Airplane dispatching	84	84	—	—	—	—	—	—	—	—	—
Mechanical technology	95	41	37	—	7	—	4	—	5	—	1
Construction technology	77	60	2	—	6	—	4	—	—	—	5
Ceramics	73	8	—	—	8	—	—	—	—	—	57
Computer programming	18	17	—	—	—	—	—	—	—	—	1
Dental hygiene	90	9	3	6	6	24	18	15	—	9	—
Dental laboratory technology	203	197	—	—	6	—	—	—	—	—	—
Drafting	626	443	136	4	17	1	4	3	8	—	10
Electronic technology	1,036	458	80	4	11	—	460	—	15	—	8
Machine design, including industrial design	88	49	14	—	4	—	1	—	16	—	4
Medical laboratory technology	158	124	—	—	4	4	14	—	3	5	4
Surveying	28	14	2	—	4	—	—	—	3	—	5
Industrial production methods	22	12	5	—	2	—	—	—	3	—	—
X-ray technology	92	89	—	—	—	—	—	3	—	—	—
All other technology	113	98	—	—	—	—	10	—	—	5	—
High school teachers (licensed)	17,351	5,219	2,988	1,080	804	292	1,672	688	706	412	3,490
Science	8,354	2,430	1,496	551	392	131	778	335	332	205	1,704
Mathematics	8,747	2,677	1,474	519	405	153	851	324	368	201	1,775
Technical and technical-related	250	112	18	10	7	8	43	29	6	6	11

[a] Includes 161 persons reported as "naval architects."
[b] Includes 33 persons reported as "tool" and 72 persons as "hydraulic engineers."
[c] Includes 18 persons reported as "welding engineers."
[d] Includes 54 persons reported as "agricultural" and 481 persons as "technical service engineers."
[e] Includes 67 persons reported as "architectural engineers."
[f] Includes 44 persons reported as "pharmacologists."
[g] Includes 18 persons reported as "geological and geophysical engineers."
[h] Includes 106 persons reported as "nuclear engineers."

Table 48. FUNCTION OF ENGINEERS, SCIENTISTS, AND TEACHERS OF ENGINEERING, SCIENCE, AND TECHNOLOGY, BY DETAILED OCCUPATION

(Number and percent distribution)

Occupation	All functions		Engaged in research, design, development, laboratory, production, and related operations		Engaged in teaching, sales, administration	
	Number	Percent	Number	Percent	Number	Percent
All engineers, scientists, teachers	142,732	100.0	92,608	64.9	50,124	35.1
Engineers and architects	86,393	100.0	71,538	82.8	14,855	17.2
Aeronautical	1,702	100.0	1,456	85.5	246	14.5
Chemical and ceramic	7,271	100.0	5,538	76.2	1,733	23.8
Chemical	6,998	100.0	5,304	75.8	1,694	24.2
Ceramic	273	100.0	234	85.7	39	14.3
Civil and construction	16,022	100.0	13,709	85.6	2,313	14.4
Civil and construction	15,660	100.0	13,375	85.4	2,285	14.6
Sanitary	204	100.0	199	97.5	5	2.5
Transportation	158	100.0	135	85.4	23	14.6
Electrical and electronic	26,164	100.0	23,266	88.9	2,898	11.1
Industrial	5,443	100.0	4,485	82.4	958	17.6
Industrial	4,835	100.0	4,135	85.5	700	14.5
Safety	608	100.0	350	57.6	258	42.4
Mechanical	22,721	100.0	18,147	79.9	4,574	20.1
Air conditioning, heating, and refrigeration	2,069	100.0	1,528	73.9	541	26.1
Marine engineering and naval architecture	872[a]	100.0	771	88.4	101	11.6
Textile	102	100.0	64	62.7	38	37.3
Optical	104	100.0	99	95.2	5	4.8
Other mechanical	19,574[b]	100.0	15,685	80.1	3,889	19.9
Metallurgical	1,065[c]	100.0	906	85.1	159	14.9
Mining and petroleum	166	100.0	131	78.9	35	21.1
Sales	1,264	100.0	7	0.6	1,257	99.4
Engineers n.e.c.	624[d]	100.0	550	88.1	74	11.9
Architects	3,951[e]	100.0	3,343	84.6	608	15.4
Scientists and mathematicians	21,123	100.0	18,442	87.3	2,681	12.7
Agricultural scientists	490	100.0	422	86.1	68	13.9
Biological scientists	1,771[f]	100.0	1,540	87.0	231	13.0
Chemists	9,791	100.0	8,340	85.2	1,451	14.8
Food technologists	154	100.0	145	94.2	9	5.8
Other	9,637	100.0	8,195	85.0	1,442	15.0
Geologists and geophysicists	345[g]	100.0	252	73.0	93	27.0
Mathematicians	1,802	100.0	1,426	79.1	376	20.9
Metallurgists	426	100.0	380	89.2	46	10.8
Meteorologists	111	100.0	111	100.0	—	—
Physicists	2,763	100.0	2,513	91.0	250	9.0
Engineering physicists	300	100.0	298	99.3	2	0.7
Other	2,463[h]	100.0	2,215	89.9	248	10.1
Research pharmacists	290	100.0	288	99.3	2	0.7
Medical scientists	3,114	100.0	3,046	97.8	68	2.2
Pathologists	681	100.0	676	99.3	5	0.7
Radiologists	665	100.0	661	99.4	4	0.6
Other	1,768	100.0	1,709	96.7	59	3.3
Scientists n.e.c.	220	100.0	124	56.4	96	43.6
College teachers	17,865	100.0	2,626	14.7	15,239	85.3
Engineering and architecture	2,834	100.0	449	15.8	2,385	84.2
Aeronautical	103	100.0	4	3.9	99	96.1
Chemical	215	100.0	68	31.6	147	68.4
Civil and construction	359	100.0	43	12.0	316	88.0
Electrical and electronic	821	100.0	215	26.2	606	73.8
Industrial	144	100.0	17	11.8	127	88.2

Continued

Table 48. FUNCTION OF ENGINEERS, SCIENTISTS, AND TEACHERS OF ENGINEERING, SCIENCE, AND TECHNOLOGY, BY DETAILED OCCUPATION

(Number and percent distribution)

Occupation	All functions		Engaged in research, design, development, laboratory, production, and related operations		Engaged in teaching, sales, administration	
	Number	Percent	Number	Percent	Number	Percent
College teachers (continued)						
Marine engineering	118	100.0	13	11.0	105	89.0
Mechanical	395	100.0	46	11.6	349	88.4
Metallurgical	119	100.0	24	20.2	95	79.8
All other engineering	46	100.0	13	28.3	33	71.7
Architecture, design or theory	514	100.0	6	1.2	508	98.8
Science and mathematics	12,228	100.0	2,171	17.8	10,057	82.2
Agriculture, forestry, horticulture, and architectural landscaping	314	100.0	44	14.0	270	86.0
Biology	1,303	100.0	143	11.0	1,160	89.0
Chemistry	1,736	100.0	272	15.7	1,464	84.3
Geology, earth science, atmosphere science	280	100.0	60	21.4	220	78.6
Mathematics	1,595	100.0	134	8.4	1,461	91.6
Medical science n.e.c.	4,881	100.0	1,012	20.7	3,869	79.3
General science (including public health)	141	100.0	6	4.3	135	95.7
Physics and radiology	1,805	100.0	426	23.6	1,379	76.4
Pharmacy, pharmacology	140	100.0	68	48.6	72	51.4
All other	33	100.0	6	18.2	27	81.8
Technology	2,803	100.0	6	0.2	2,797	99.8
Airplane dispatching	84	100.0	—	—	84	100.0
Mechanical technology	95	100.0	—	—	95	100.0
Construction technology	77	100.0	—	—	77	100.0
Ceramics	73	100.0	4	5.5	69	94.5
Computer programming	18	100.0	—	—	18	100.0
Dental hygiene	90	100.0	—	—	90	100.0
Dental laboratory technology	203	100.0	—	—	203	100.0
Drafting	626	100.0	1	0.2	625	99.8
Electronic technology	1,036	100.0	—	—	1,036	100.0
Machine design, including industrial design	88	100.0	1	1.1	87	98.9
Medical laboratory technology	158	100.0	—	—	158	100.0
Surveying	28	100.0	—	—	28	100.0
Industrial production methods	22	100.0	—	—	22	100.0
X-ray technology	92	100.0	—	—	92	100.0
All other technology	113	100.0	—	—	113	100.0
High school teachers (licensed)	17,351	100.0	2	[1]	17,349	100.0
Science	8,354	100.0	2	[1]	8,352	100.0
Mathematics	8,747	100.0	—	—	8,747	100.0
Technical and technical-related	250	100.0	—	—	250	100.0

[a] Includes 161 persons reported as "naval architects."
[b] Includes 33 persons reported as "tool" and 72 persons as "hydraulic engineers."
[c] Includes 18 persons reported as "welding engineers."
[d] Includes 54 persons reported as "agricultural" and 481 persons as "technical service engineers."
[e] Includes 67 persons reported as "architectural engineers."
[f] Includes 44 persons reported as "pharmacologists."
[g] Includes 18 persons reported as "geological and geophysical engineers."
[h] Includes 106 persons reported as "nuclear engineers."
[i] Less than 0.05 of a percent.

Table 49. DEGREE HELD BY ENGINEERS, SCIENTISTS, AND TEACHERS OF ENGINEERING, SCIENCE, AND TECHNOLOGY, BY DETAILED OCCUPATION

(Number and percent with degrees)

Occupation	Total number	With bachelor or higher degree			
		All degrees		Engineering, architecture, or science degree	
		Number	Percent of total	Number	Percent of total
All engineers, scientists, teachers	142,732	127,231	89.1	124,511	87.2
Engineers and architects	86,393	72,757	84.2	71,244	82.5
Aeronautical	1,702	1,484	87.2	1,480	87.0
Chemical and ceramic	7,271	6,883	94.7	6,809	93.6
Chemical	6,998	6,642	94.9	6,575	94.0
Ceramic	273	241	88.3	234	85.7
Civil and construction	16,022	12,921	80.6	12,791	79.8
Civil and construction	15,660	12,598	80.4	12,470	79.6
Sanitary	204	184	90.2	184	90.2
Transportation	158	139	88.0	137	86.7
Electrical and electronic	26,164	22,331	85.4	22,019	84.2
Industrial	5,443	4,071	74.8	3,797	69.8
Industrial	4,835	3,658	75.7	3,455	71.5
Safety	608	413	67.9	342	56.3
Mechanical	22,721	18,763	82.6	18,219	80.2
Air conditioning, heating, and refrigeration	2,069	1,907	92.2	1,714	82.8
Marine engineering and naval architecture	872[a]	749	85.9	711	81.5
Textile	102	92	90.2	84	82.4
Optical	104	86	82.7	86	82.7
Other mechanical	19,574[b]	15,929	81.4	15,624	79.8
Metallurgical	1,065[c]	974	91.5	948	89.0
Mining and petroleum	166	153	92.2	153	92.2
Sales	1,264	1,015	80.3	931	73.7
Engineers n.e.c.	624[d]	603	96.6	602	96.5
Architects	3,951[e]	3,559	90.1	3,495	88.5
Scientists and mathematicians	21,123	20,392	96.5	19,932	94.4
Agricultural scientists	490	461	94.1	455	92.9
Biological scientists	1,771[f]	1,707	96.4	1,688	95.3
Chemists	9,791	9,399	96.0	9,198	93.9
Food technologists	154	147	95.5	147	95.5
Other	9,637	9,252	96.0	9,051	93.9
Geologists and geophysicists	345[g]	344	99.7	329	95.4
Mathematicians	1,802	1,699	94.3	1,502	83.4
Metallurgists	426	370	86.9	367	86.2
Meteorologists	111	90	81.1	85	76.6
Physicists	2,763	2,715	98.3	2,701	97.8
Engineering physicists	300	300	100.0	300	100.0
Other	2,463[h]	2,415	98.1	2,401	97.5
Research pharmacists	290	290	100.0	290	100.0
Medical scientists	3,114	3,098	99.5	3,098	99.5
Pathologists	681	681	100.0	681	100.0
Radiologists	665	664	99.8	664	99.8
Other	1,768	1,753	99.2	1,753	99.2
Scientists n.e.c.	220	219	99.5	219	99.5
College teachers	17,865	16,731	93.7	16,024	89.7
Engineering and architecture	2,834	2,820	99.5	2,755	97.2
Aeronautical	103	103	100.0	103	100.0
Chemical	215	215	100.0	215	100.0
Civil and construction	359	359	100.0	359	100.0
Electrical and electronic	821	821	100.0	787	95.9
Industrial	144	144	100.0	143	99.3

Continued

Table 49. DEGREE HELD BY ENGINEERS, SCIENTISTS, AND TEACHERS OF ENGINEERING, SCIENCE, AND TECHNOLOGY, BY DETAILED OCCUPATION

(Number and percent with degrees)

Occupation	Total number	With bachelor or higher degree			
		All degrees		Engineering, architecture, or science degree	
		Number	Percent of total	Number	Percent of total
College teachers (continued)					
Marine engineering	118	118	100.0	110	93.2
Mechanical	395	395	100.0	395	100.0
Metallurgical	119	119	100.0	119	100.0
All other engineering	46	46	100.0	46	100.0
Architecture, design or theory	514	500	97.3	478	93.0
Science and mathematics	12,228	12,218	99.9	11,796	96.5
Agriculture, forestry, horticulture, and architectural landscaping	314	314	100.0	314	100.0
Biology	1,303	1,303	100.0	1,238	95.0
Chemistry	1,736	1,736	100.0	1,678	96.7
Geology, earth science, atmosphere science	280	280	100.0	280	100.0
Mathematics	1,595	1,585	99.4	1,395	87.5
Medical science n.e.c.	4,881	4,881	100.0	4,881	100.0
General science (including public health)	141	141	100.0	111	78.7
Physics and radiology	1,805	1,805	100.0	1,726	95.6
Pharmacy, pharmacology	140	140	100.0	140	100.0
All other	33	33	100.0	33	100.0
Technology	2,803	1,693	60.4	1,473	52.6
Airplane dispatching	84	—	—	—	—
Mechanical technology	95	88	92.6	85	89.5
Construction technology	77	55	71.4	47	61.0
Ceramics	73	61	83.6	54	74.0
Computer programming	18	15	83.3	11	61.1
Dental hygiene	90	55	61.1	42	46.7
Dental laboratory technology	203	49	24.1	21	10.3
Drafting	626	332	53.0	225	35.9
Electronic technology	1,036	687	66.3	680	65.6
Machine design, including industrial design	88	81	92.0	75	85.2
Medical laboratory technology	158	136	86.1	128	81.0
Surveying	28	19	67.9	18	64.3
Industrial production methods	22	22	100.0	22	100.0
X-ray technology	92	70	76.1	45	48.9
All other technology	113	23	20.4	20	17.7
High school teachers (licensed)	17,351	17,351	100.0	17,311	99.8
Science	8,354	8,354	100.0	8,339	99.8
Mathematics	8.747	8,747	100.0	8,722	99.7
Technical and technical-related	250	250	100.0	250	100.0

[a] Includes 161 persons reported as "naval architects."
[b] Includes 33 persons reported as "tool" and 72 persons as "hydraulic engineers."
[c] Includes 18 persons reported as "welding engineers."
[d] Includes 54 persons reported as "agricultural" and 481 persons as "technical service engineers."
[e] Includes 67 persons reported as "architectural engineers."
[f] Includes 44 persons reported as "pharmacologists."
[g] Includes 18 persons reported as "geological and geophysical engineers."
[h] Includes 106 persons reported as "nuclear engineers."

Table 50.
RATIO OF PERSONS IN TECHNICAL OCCUPATIONS TO ENGINEERS AND SCIENTISTS, BY INDUSTRY GROUP

Industry group	Persons in technical occupations	Engineers and scientists[a]	Ratio
All industries	148,684	125,381	1.19
Manufacturing	59,085	54,563	1.08
Durable goods	49,821	42,179	1.18
Ordnance and accessories	3,125	2,705	1.16
Lumber and wood products, except furniture	26	21	1.24
Furniture and fixtures	534	101	5.29
Stone, clay, and glass products	1,423	1,836	0.78
Primary metal industries	1,606	1,336	1.20
Fabricated metal products	2,567	1,812	1.42
Machinery, except electrical	9,622	7,348	1.31
Electrical machinery and equipment	13,534	13,295	1.02
Transportation equipment	8,771	5,561	1.58
Instruments; photographic and optical goods	8,613	8,164	1.05
Nondurable goods	9,264	12,384	0.75
Food and kindred products	1,553	1,839	0.84
Tobacco manufactures	22	24	0.92
Textile mill products	456	496	0.92
Apparel and other finished fabric products	78	80	0.98
Paper and allied products	916	986	0.93
Printing, publishing, and allied industries	1,094	223	4.91
Chemicals and allied products	3,807	7,314	0.52
Petroleum refining and related industries	766	786	0.97
Rubber and miscellaneous plastics products	223	334	0.67
Leather and leather products	120	34	3.53
Miscellaneous manufacturing industries	229	268	0.85
Nonmanufacturing	89,599	70,818	1.27
Mining	39	138	0.28
Contract construction	7,523	7,820	0.96
General building contractors	3,190	2,449	1.30
Heavy construction	1,657	2,610	0.63
Special trade contractors	2,676	2,761	0.97
Transportation, communication, and public utilities	14,084	4,728	2.98
Railroad transportation	973	312	3.12
Local and interurban passenger transportation	5	1	5.00
Motor freight transportation and warehousing	9	11	0.82
Water transportation	23	276	0.08
Air transportation	2,460	124	19.84
Pipe line transportation	—	—	—
Transportation services	4	214	0.02
Communication	8,175	2,428	3.37
Electric, gas, and sanitary services	2,435	1,362	1.79
Wholesale and retail trade	6,299	6,585	0.96
Wholesale trade	5,870	6,246	0.94
Retail trade	429	339	1.27
Building materials, hardware, and farm equipment	68	63	1.08
General merchandise stores	135	46	2.93
Food stores	26	7	3.71
Automotive dealers and service stations	—	—	—
Apparel and accessories	18	10	1.80
Furniture, home furnishings, and equipment	119	165	0.72
Eating and drinking places	18	3	6.00
Miscellaneous retail stores	45	45	1.00
Finance, insurance, and real estate	2,124	1,175	1.81
Banking	459	43	10.67
Credit agencies other than banks	35	—	[b]
Security and commodity brokers, dealers, exchanges, and services	189	2	94.50
Insurance carriers	1,164	614	1.90

Continued

Table 50.
RATIO OF PERSONS IN TECHNICAL OCCUPATIONS TO ENGINEERS AND SCIENTISTS, BY INDUSTRY GROUP

Industry group	Persons in technical occupations	Engineers and scientists[a]	Ratio
Insurance agents, brokers, and services	137	55	2.49
Real estate	41	419	0.10
Combinations of real estate, insurance, loan, law offices	—	—	—
Holding and other investment companies	99	42	2.36
Services and miscellaneous	38,467	33,580	1.15
Hotels, rooming houses, camps, and other lodging places	30	37	0.81
Personal services	22	8	2.75
Miscellaneous business services	6,179	6,748	0.92
Advertising, news, credit, duplicating, building, and related services	46	42	1.10
Business services n.e.c.	6,133	6,706	0.91
Research, development, testing laboratories	2,803	3,924	0.71
Business and management consulting services	2,042	2,162	0.94
Other business services n.e.c.	1,288	620	2.08
Automobile repair, automobile services, garages	4	—	[b]
Miscellaneous repair services	208	4	52.00
Motion pictures	203	32	6.34
Amusement and recreation, except motion pictures	42	19	2.21
Private medical services	16,496	1,836	8.98
Offices of physicians and surgeons	2,173	105	20.70
Offices of dentists and dental surgeons	3,284	—	[b]
Hospitals (nongovernment)	7,402	1,411	5.25
Proprietary hospitals	568	128	4.44
Voluntary hospitals	6,834	1,283	5.33
Medical and dental laboratories	3,146	175	17.98
Offices of osteopathic physicians, chiropractors, and health and allied services n.e.c.	491	145	3.39
Legal services	—	60	[c]
Private colleges and schools	3,754	14,358	0.26
Nonprofit membership organizations	349	88	3.97
Miscellaneous services	11,180	10,288	1.09
Engineering and architectural services	9,904	8,694	1.14
Nonprofit educational and scientific research	1,094	1,532	0.71
Accounting, auditing, bookkeeping, and other services n.e.c.	182	62	2.94
Miscellaneous	—	102	[c]
Government	21,063	16,792	1.25
County	1,587	1,141	1.39
Hospitals	311	71	4.38
Colleges	12	582	0.02
Other	1,264	488	2.59
New York State	4,905	5,897	0.83
Hospitals	804	279	2.88
Colleges	520	2,183	0.24
Other	3,581	3,435	1.04
New York City	6,390	6,044	1.06
Hospitals	1,199	380	3.16
Colleges	183	1,352	0.14
Other	5,008	4,312	1.16
Cities other than New York City	877	448	1.96
Hospitals	48	7	6.86
Colleges	—	60	[c]
Other	829	381	2.18
Towns and villages	966	165	5.85
Hospitals	48	10	4.80
Other	918	155	5.92
Federal	6,338	3,097	2.05
Hospitals	963	203	4.74
Colleges	7	33	0.21
Arsenals and navy yards	1,469	836	1.76
Other	3,899	2,025	1.93

[a] Does not include high-school teachers.
[b] No engineers or scientists; persons in technical occupations only.
[c] No persons in technical occupations; engineers or scientists only.

Table 51. TRAINING AND TUITION-REFUND PROGRAMS, BY AREA, BY INDUSTRY DIVISION, AND BY SIZE OF ESTABLISHMENT

(Number of establishments with programs as a percent of all establishments with technical occupations; numberof persons in technical occupations in these establishments as a percent of all persons in technical occupations)

Area; industry division; size of establishment	Establishments with training and/or tuition-refund programs				Establishments with training programs				Establishments with tuition-refund programs			
	Establishments		Persons in technical occupations		Establishments		Persons in technical occupations		Establishments		Persons in technical occupations	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All areas, industries, and sizes	1,811	12.4	82,163	55.3	882	6.0	53,503	36.0	1,363	9.3	70,364	47.3
Area												
New York City	604	9.1	27,240	43.4	263	4.0	16,140	25.7	441	6.6	21,560	34.4
Nassau-Suffolk	174	10.4	16,390	71.8	91	5.4	9,788	42.9	140	8.4	15,108	66.2
Westchester	95	10.3	2,820	49.1	34	3.7	1,425	24.8	72	7.8	2,461	42.8
Albany	92	18.0	4,534	62.6	59	11.6	4,083	56.4	64	12.5	3,548	49.0
Binghamton	36	14.8	2,661	68.5	11	4.5	1,892	48.7	34	13.9	2,601	66.9
Buffalo	236	20.9	7,442	57.4	115	10.2	5,161	39.8	186	16.5	6,297	48.6
Rochester	142	24.7	6,587	80.7	101	17.5	4,274	52.4	99	17.2	6,273	76.8
Syracuse	71	14.9	3,420	62.3	33	6.9	2,725	49.6	59	12.3	3,324	60.5
Utica	57	23.9	2,095	72.5	28	11.8	1,722	59.6	45	18.9	1,606	55.6
All other	304	14.0	8,974	53.7	147	6.8	6,293	37.6	223	10.3	7,586	45.4
Industry division												
Manufacturing	1,004	28.0	45,486	77.0	385	10.7	26,961	45.6	862	24.0	42,810	72.5
Construction	66	4.3	562	7.5	40	2.6	120	1.6	50	3.2	490	6.5
Transportation, communication, and public utilities	95	25.1	11,469	81.4	52	13.8	9,626	68.3	75	19.8	10,068	71.5
Private medical services	184	3.5	4,945	30.0	160	3.0	3,840	23.3	41	0.8	1,707	10.3
Research laboratories and engineering services[a]	108	6.9	4,150	28.1	50	3.2	1,800	12.2	67	4.3	3,290	22.3
Private colleges and schools	29	32.6	2,708	72.1	8	9.0	379	10.1	26	29.2	2,693	71.7
Government	89	10.5	6,035	28.7	77	9.1	5,559	26.4	32	3.8	2,712	12.9
All other	236	17.9	6,808	57.1	110	8.3	5,218	43.7	210	15.9	6,594	55.3
Size of establishment (number of employees)												
1-19	117	1.5	532	3.4	97	1.2	432	2.7	25	0.3	124	0.8
20-49	321	15.0	2,011	20.7	151	7.1	1,421	14.6	240	11.2	1,236	12.7
50-99	338	21.6	4,199	35.2	157	10.0	2,782	23.3	269	17.2	3,341	28.0
100-199	265	25.2	4,627	40.4	106	10.1	2,908	25.4	219	20.8	3,851	33.6
200-499	317	31.1	7,046	45.7	114	11.2	3,200	20.7	246	24.1	5,400	35.0
500-999	217	45.5	9,816	61.6	119	24.9	6,019	37.8	161	33.8	7,022	44.1
1000-1999	113	43.3	10,113	62.8	62	23.8	5,909	36.7	98	37.5	8,131	50.5
2000-4999	79	58.1	14,728	78.3	44	32.4	9,014	47.9	69	50.7	13,035	69.3
5000 or more	44	63.8	29,091	87.0	32	46.4	21,818	65.2	36	52.2	28,224	84.4

[a] Includes architectural as well as engineering service enterprises; research, development, and testing laboratories; and business and management consulting services.

Table 52. ESTABLISHMENTS WITH (A) TRAINING OR (B) TUITION-REFUND PROGRAMS AS A PERCENT OF ALL ESTABLISHMENTS WITH TECHNICAL OCCUPATIONS, BY INDUSTRY DIVISION AND SIZE OF ESTABLISHMENT

(Also number of persons they employ in technical occupations as a percent of all persons in technical occupations)

Size of establishment (number of employees)	All industries	Manufacturing	Construction	Transportation, communication, utilities	Private medical services	Research labs and engineering services[a]	Private colleges and schools	Government	All other
A-1. With training programs—establishments (percent)									
All sizes	6.0	10.7	2.6	13.8	3.0	3.2	9.0	9.1	8.3
1- 49	2.5	3.9	3.3	2.2	1.2	2.4	15.4	12.1	2.6
50- 99	10.0	13.2	2.1	2.3	12.5	8.0	0.0	12.7	27.2
100- 499	10.6	12.1	1.2	14.5	18.2	8.8	0.0	5.8	13.1
500- 999	24.9	27.0	0.0	40.0	59.5	50.0	12.5	6.3	14.1
1,000-4,999	26.7	36.5	0.0	45.7	47.4	42.9	0.0	7.0	21.6
5,000 or more	46.4	66.7	—	87.5	—	—	33.3	18.5	50.0
A-2. With training programs—persons in technical occupations (percent)									
All sizes	36.0	45.6	1.6	68.3	23.3	12.2	10.1	26.4	43.7
1- 49	7.2	9.2	3.1	2.4	3.7	3.8	16.7	42.3	12.8
50- 99	23.3	20.7	0.9	1.0	47.4	8.6	0.0	45.4	63.5
100- 499	22.7	19.9	1.2	13.8	28.4	7.9	0.0	34.8	49.0
500- 999	37.8	38.8	0.0	70.8	60.7	19.6	0.9	25.2	28.0
1,000-4,999	42.8	50.8	0.0	58.0	38.4	50.3	0.0	19.8	60.7
5,000 or more	65.2	70.9	—	98.9	—	—	21.0	27.2	86.6
B-1. With tuition-refund programs—establishments (percent)									
All sizes	9.3	24.0	3.2	19.8	0.8	4.3	29.2	3.8	15.9
1- 49	2.6	8.7	2.7	1.6	0.2	2.3	7.7	2.6	6.3
50- 99	17.2	26.3	4.0	34.9	1.4	13.3	0.0	5.1	30.4
100- 499	22.4	34.4	2.4	19.7	7.2	26.5	35.7	4.5	26.2
500- 999	33.8	57.3	15.4	45.0	12.2	100.0	75.0	2.7	39.4
1,000-4,999	42.1	65.5	33.3	58.7	42.1	71.4	50.0	2.6	43.1
5,000 or more	52.2	85.7	—	75.0	—	—	100.0	14.8	50.0
B-2. With tuition-refund programs—persons in technical occupations (percent)									
All sizes	47.3	72.5	6.5	71.5	10.3	22.3	71.7	12.9	55.3
1- 49	5.3	16.2	1.5	1.2	0.3	4.0	7.4	5.6	11.3
50- 99	28.0	43.5	2.0	9.9	0.4	10.3	0.0	14.7	64.5
100- 499	34.4	46.7	5.7	14.0	10.1	20.1	28.8	22.8	60.0
500- 999	44.1	66.0	38.1	61.8	12.1	100.0	63.1	2.6	66.6
1,000-4,999	60.7	82.5	48.8	75.7	50.6	84.3	52.3	1.6	87.4
5,000 or more	84.4	99.0	—	90.2	—	—	100.0	29.3	83.5

[a] Includes architectural as well as engineering service enterprises; research, development, and testing laboratories; and business and management consulting services.

Table 53. UNIVERSE AND SAMPLE COVERED BY THE SURVEY, BY INDUSTRY GROUP

(Including number of establishments, the workers they employ, number who are engineers and scientists, and number in technical occupations)

Industry group	Universe				Sample				Percentage sample is of universe			
	Establishments	Employees	Engineers and scientists	Persons in technical occupations	Establishments	Employees	Engineers and scientists	Persons in technical occupations	Establishments	Employees	Engineers and scientists	Persons in technical occupations
All industries	393,516	6,227,656	142,732	148,684	17,414	3,137,701	112,673	118,631	4.4	50.4	78.9	79.8
Manufacturing	48,017	1,876,160	54,563	59,085	4,441	993,030	43,625	49,161	9.2	52.9	80.0	83.2
Durable goods	13,758	822,545	42,179	49,821	2,266	607,281	36,832	43,723	16.5	73.8	87.3	87.8
Ordnance and accessories	15	18,766	2,705	3,125	12	18,505	2,633	3,083	80.0	98.6	97,3	98.7
Lumber and wood products, except furniture	1,334	16,283	21	26	47	2,397	12	14	3.5	14.7	57.1	53.8
Furniture and fixtures	1,607	34,803	101	534	86	9,976	47	262	5.4	28.7	46.5	49.1
Stone, clay, and glass products	1,159	50,174	1,836	1,423	95	29,518	1,288	1,017	8.2	58.8	70.2	71.5
Primary metal industries	585	71,965	1,336	1,606	166	62,424	1,209	1,493	28.4	86.7	90.5	93.0
Fabricated metal products	3,079	94,997	1,812	2,567	582	53,199	1,097	1,691	18.9	56.0	60.5	65.9
Machinery, except electrical	2,762	157,043	7,348	9,622	501	111,942	5,872	8,241	18.1	71.3	79.9	85.6
Electrical machinery and equipment	1,767	174,858	13,295	13,534	427	139,123	11,595	11,300	24.2	79.6	87.2	83.5
Transportation equipment	437	101,186	5,561	8,771	126	89,223	5,247	8,486	28.8	88.2	94.4	96.8
Instruments; photographic and optical goods	1,013	102,470	8,164	8,613	224	90,974	7,832	8,136	22.1	88.8	95.9	94.5
Nondurable goods	34,259	1,053,615	12,384	9,264	2,175	385,749	6,793	5,438	6.3	36.6	54.9	58.7
Food and kindred products	3,360	154,839	1,839	1,553	292	71,827	1,027	800	8.7	46.4	55.8	51.5
Tobacco manufactures	59	2,815	24	22	7	1,257	4	7	11.9	44.7	16.7	31.8
Textile mill products	1,859	64,417	496	456	120	19,962	360	317	6.5	31.0	72.6	69.5
Apparel and other finished fabric products	13,146	314,511	80	78	706	61,566	46	64	5.4	19.6	57.5	82.1
Paper and allied products	1,066	68,351	986	916	146	31,039	434	498	13.7	45.4	44.0	54.4
Printing, publishing, and allied industries	6,333	171,221	223	1,094	320	75,604	133	422	5.1	44.2	59.6	38.6
Chemical and allied products	1,474	87,445	7,314	3,807	147	50,901	3,686	2,191	10.0	58.2	50.4	57.6
Petroleum refining and related industries	129	11,462	786	766	30	9,540	742	741	23.3	83.2	94.4	96.7
Rubber and miscellaneous plastics products	760	23,203	334	223	49	9,065	205	139	6.4	39.1	61.4	62.3
Leather and leather products	1,401	61,135	34	120	132	26,283	27	86	9.4	43.0	79.4	71.7
Miscellaneous manufacturing industries	4,672	94,216	268	229	226	28,705	129	173	4.8	30.5	48.1	75.5
Nonmanufacturing	345,499	4,351,496	88,169	89,599	12,973	2,144,671	69,048	69,470	3.8	49.3	78.3	77.5
Mining	520	9,129	138	39	39	3,802	102	26	7.5	41.6	73.9	66.7
Contract construction	33,948	302,532	7,820	7,523	682	59,398	1,868	2,039	2.0	19.6	23.9	27.1
General building contractors	9,274	67,229	2,449	3,190	174	13,357	960	1,085	1.9	19.9	39.2	34.0
Heavy construction	2,072	52,342	2,610	1,657	112	16,109	551	390	5.4	30.8	21.1	23.5
Special trade contractors	22,602	182,961	2,761	2,676	396	29,932	357	564	1.8	16.4	12.9	21.1

Continued

Table 53. UNIVERSE AND SAMPLE COVERED BY THE SURVEY, BY INDUSTRY GROUP

(Including number of establishments, the workers they employ, number who are engineers and scientists, and number in technical occupations)

Industry group	Universe				Sample				Percentage sample is of universe			
	Establishments	Employees	Engineers and scientists	Persons in technical occupations	Establishments	Employees	Engineers and scientists	Persons in technical occupations	Establishments	Employees	Engineers and scientists	Persons in technical occupations
Transportation, communication, and public utilities	13,075	469,627	4,728	14,084	778	327,323	4,309	12,902	6.0	69.7	91.1	91.6
Railroad transportation	153	57,180	312	973	73	55,054	287	909	47.7	96.3	92.0	93.4
Local and interurban passenger transportation	1,989	37,011	1	5	84	15,023	1	5	4.2	40.6	100.0	100.0
Motor freight transportation and warehousing	7,429	76,175	11	9	183	16,379	7	9	2.5	21.5	63.6	100.0
Water transportation	842	67,161	276	23	87	38,588	139	17	10.3	57.5	50.4	73.9
Air transportation	197	39,665	124	2,460	82	36,579	124	2,342	41.6	92.2	100.0	95.2
Pipe line transportation	8	180	—	—	6	170	—	—	75.0	94.4	—	—
Transportation services	1,781	21,781	214	4	55	3,687	21	4	3.1	16.9	9.8	100.0
Communication	377	114,024	2,428	8,175	136	107,731	2,385	7,204	36.1	94.5	98.2	88.1
Electric, gas, and sanitary services	299	56,450	1,362	2,435	72	54,112	1,345	2,412	24.1	95.9	98.8	99.1
Wholesale and retail trade	150,121	1,251,656	6,585	6,299	2,709	280,993	1,741	2,927	1.8	22.4	26.4	46.5
Wholesale trade	40,787	421,582	6,246	5,870	999	71,090	1,677	2,764	2.4	16.9	26.8	47.1
Retail trade	109,334	830,074	339	429	1,710	209,903	64	163	1.6	25.3	18.9	38.0
Building materials, hardware, and farm equipment	5,808	31,398	63	68	87	1,215	2	9	1.5	3.9	3.2	13.2
General merchandise stores	4,050	146,273	46	135	188	89,222	40	95	4.6	61.0	87.0	70.4
Food stores	19,299	150,296	7	26	306	34,259	5	15	1.6	22.8	71.4	57.7
Automotive dealers and service stations	14,056	78,179	—	—	165	3,819	—	—	1.2	4.9	—	—
Apparel and accessories	10,035	87,211	10	18	220	36,465	7	18	2.2	41.8	70.0	100.0
Furniture, home furnishings, and equipment	6,589	36,146	165	119	98	3,732	5	8	1.5	10.3	3.0	6.7
Eating and drinking places	29,801	214,819	3	18	403	34,425	2	15	1.4	16.0	66.7	83.3
Miscellaneous retail stores	19,696	85,752	45	45	243	6,766	3	3	1.2	7.9	6.7	6.7
Finance, insurance, and real estate	44,738	492,964	1,175	2,124	918	225,510	442	1,721	2.1	45.7	37.6	81.0
Banking	937	130,011	43	459	122	85,510	39	404	13.0	65.8	90.7	88.0
Credit agencies other than banks	1,484	20,104	—	35	55	4,712	—	26	3.7	23.4	—	74.3
Security and commodity brokers, dealers, exchanges, and services	1,904	60,750	2	189	125	34,962	2	147	6.6	57.6	100.0	77.8
Insurance carriers	1,360	120,115	614	1,164	147	79,687	310	965	10.8	66.3	50.5	82.9
Insurance agents, brokers, and services	5,480	31,989	55	137	96	6,778	16	93	1.8	21.2	29.1	67.9
Real estate	31,039	118,543	419	41	319	11,556	33	27	1.0	9.7	7.9	65.9
Combinations of real estate, insurance, loan, law offices	1,556	4,748	—	—	28	195	—	—	1.8	4.1	—	—
Holding and other investment companies	978	6,704	42	99	26	2,110	42	59	2.7	31.5	100.0	59.6

Continued

Table 53. UNIVERSE AND SAMPLE COVER ED BY THE SURVEY, BY INDUSTRY GROUP

(Including number of establishments, the workers they employ, number who are engineers and scientists, and number in technical occupations)

Industry group	Universe				Sample				Percentage sample is of universe			
	Establishments	Employees	Engineers and scientists	Persons in technical occupations	Establishments	Employees	Engineers and scientists	Persons in technical occupations	Establishments	Employees	Engineers and scientists	Persons in technical occupations
Services and miscellaneous	99,989	950,995	35,829	38,467	6,258	424,491	29,080	29,071	6.3	44.6	81.2	75.6
Hotels, rooming houses, camps, and other lodging places	5,779	66,516	37	30	129	28,901	9	2	2.2	43.4	24.3	6.7
Personal services	20,738	99,963	8	22	252	12,881	4	10	1.2	12.9	50.0	45.5
Miscellaneous business services	10,633	180,165	6,748	6,179	1,543	106,257	5,871	5,080	14.5	59.0	87.0	82.2
Advertising, news, credit, duplicating, building, and related services	4,532	86,907	42	46	178	36,330	30	45	3.9	41.8	71.4	97.8
Business services n.e.c.	6,101	93,258	6,706	6,133	1,365	69,927	5,811	5,035	22.4	75.0	87.1	82.1
Research, development, testing laboratories	302	14,432	3,924	2,803	182	12,744	3,577	2,384	60.3	88.3	91.2	85.1
Business and management consulting services	2,387	23,359	2,162	2,042	411	17,058	1,893	1,748	17.2	73.0	87.6	85.6
Other business services n.e.c.	3,412	55,467	620	1,288	772	40,125	371	903	22.6	72.3	59.8	70.1
Automobile repair, automobile services, garages	5,981	27,806	—	4	80	2,453	—	4	1.3	8.8	—	100.0
Miscellaneous repair services	3,972	16,451	4	208	53	786	4	64	1.3	4.8	100.0	30.8
Motion pictures	1,635	28,630	32	203	150	5,821	19	89	9.2	20.3	59.4	43.8
Amusement and recreation, except motion pictures	4,970	44,050	19	42	114	7,454	10	19	2.3	16.9	52.6	45.2
Private medical services	18,468	184,991	1,836	16,496	1,860	125,342	1,446	9,880	10.1	67.8	78.8	59.9
Offices of physicians and surgeons	10,209	20,680	105	2,173	496	2,375	52	323	4.9	11.5	49.5	14.9
Offices of dentists and dental surgeons	5,689	9,241	—	3,284	240	534	—	203	4.2	5.8	—	6.2
Hospitals (nongovernment)	394	135,532	1,411	7,402	323	114,716	1,214	6,357	82.0	84.6	86.0	85.9
Proprietary hospitals	100	13,729	128	568	73	10,386	95	434	73.0	75.7	74.2	76.4
Voluntary hospitals	294	121,803	1,283	6,834	250	104,330	1,119	5,923	85.0	85.7	87.2	86.7
Medical and dental laboratories	783	4,451	175	3,146	640	4,142	157	2,904	81.7	93.1	89.7	92.3
Offices of osteopathic physicians, chiropractors, and health and allied services n.e.c.	1,393	15,087	145	491	161	3,575	23	93	11.6	23.7	15.9	18.9
Legal services	9,733	32,968	60	—	120	4,410	10	—	1.2	13.4	16.7	—
Private colleges and schools	2,066	112,937	16,607	3,754	231	83,182	12,629	3,559	11.2	73.7	76.0	94.8
Nonprofit membership organizations	6,491	79,640	88	349	191	11,067	27	80	2.9	13.9	30.7	22.9
Miscellaneous services	6,815	64,796	10,288	11,180	1,503	35,722	9,050	10,284	22.1	55.1	88.0	92.0
Engineering and architectural services	1,964	25,276	8,694	9,904	1,362	23,237	7,897	9,122	69.3	91.9	90.8	92.1
Nonprofit educational and scientific research	580	14,876	1,532	1,094	63	6,524	1,142	1,019	10.9	43.9	74.5	93.1
Accounting, auditing, bookkeeping, and other services n.e.c.	4,271	24,644	62	182	78	5,961	11	143	1.8	24.2	17.7	78.6
Miscellaneous	2,708	12,082	102	—	32	215	1	—	1.2	1.8	1.0	—

Continued

Table 53. UNIVERSE AND SAMPLE COVERED BY THE SURVEY, BY INDUSTRY GROUP

(Including number of establishments, the workers they employ, number who are engineers and scientists, and number in technical occupations)

Industry group	Universe				Sample				Percentage sample is of universe			
	Establishments	Employees	Engineers and scientists	Persons in technical occupations	Establishments	Employees	Engineers and scientists	Persons in technical occupations	Establishments	Employees	Engineers and scientists	Persons in technical occupations
Government	3,108	874,593	31,894	21,063	1,589	823,154	31,506	20,784	51.1	94.1	98.8	98.7
County	88	96,994	1,141	1,587	87	96,988	1,141	1,587	98.9	100.0	100.0	100.0
Hospitals	16	6,566	71	311	16	6,566	71	311	100.0	100.0	100.0	100.0
Colleges	15	2,078	582	12	14	2,072	582	12	93.3	99.7	100.0	100.0
Other	57	88,350	488	1,264	57	88,350	488	1,264	100.0	100.0	100.0	100.0
New York State	695	127,327	5,897	4,905	693	126,858	5,849	4,904	99.7	99.6	99.2	100.0
Hospitals	25	33,063	279	804	25	33,063	279	804	100.0	100.0	100.0	100.0
Colleges	26	10,898	2,183	520	24	10,429	2,135	519	92.3	95.7	97.8	99.8
Other	644	83,366	3,435	3,581	644	83,366	3,435	3,581	100.0	100.0	100.0	100.0
New York City	139	271,335	10,328	6,390	138	269,335	10,083	6,354	99.3	99.3	97.6	99.4
Hospitals	20	33,156	380	1,199	20	33,156	380	1,199	100.0	100.0	100.0	100.0
Colleges	9	8,402	1,352	183	8	6,402	1,107	147	88.9	76.2	81.9	80.3
Other	110	229,777	8,596	5,008	110	229,777	8,596	5,008	100.0	100.0	100.0	100.0
Cities other than New York City	114	76,350	3,145	877	110	75,791	3,129	867	96.5	99.3	99.5	98.9
Hospitals	10	2,018	7	48	10	2,018	7	48	100.0	100.0	100.0	100.0
Colleges	4	356	60	—	3	254	46	—	75.0	71.3	76.7	—
Other	100	73,976	3,078	829	97	73,519	3,076	819	97.0	99.4	99.9	98.8
Towns and villages	1,575	118,056	8,286	966	352	96,646	8,207	734	22.3	81.9	99.0	76.0
Hospitals	5	1,066	10	48	2	468	4	22	40.0	43.9	40.0	45.8
Other	1,570	116,990	8,276	918	350	96,178	8,203	712	22.3	82.2	99.1	77.6
Federal	497	184,531	3,097	6,338	209	157,536	3,097	6,338	42.1	85.4	100.0	100.0
Hospitals	18	15,791	203	963	17	15,592	203	963	94.4	98.7	100.0	100.0
Colleges	1	266	33	7	1	266	33	7	100.0	100.0	100.0	100.0
Arsenals and navy yards	2	16,646	836	1,469	2	16,646	836	1,469	100.0	100.0	100.0	100.0
Other	476	151,828	2,025	3,899	189	125,032	2,025	3,899	39.7	82.4	100.0	100.0